PROGRESSIVE ARCHITECTURE

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KITCHEN DEVELOPMENT

CONCRETE SPECIFICATIONS

DECEMBER 1946

Jenkins PRACTICAL PIPING LAYOUTS 17

How to plan a HOT PROCESS — LIME and SODA WATER TREATMENT SYSTEM

This feedwater treatment system is typical of applications where operations provide exhaust steam and large quantities of water must be treated.

Raw water is admitted through a liquid level controller to sedimentation tank, then passed through a vent condenser to cut the amount of vapors escaping and conserve as much heat in the steam as possible. Lime and soda mixed into a slurry are fed into tank and treated water is decanted off top.

In normal operations with valves M, P and R closed, the water flows through valve G to header feeding the filters, and then, by means of individually-controlled valves J, to filters in service. Next, the water passes through filters and open valves K to filtered water header.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installations.

Copies of Layout No. 17, enlarged, with additional information, will be sent on request . . . also future Piping Layouts. Just mail coupon.

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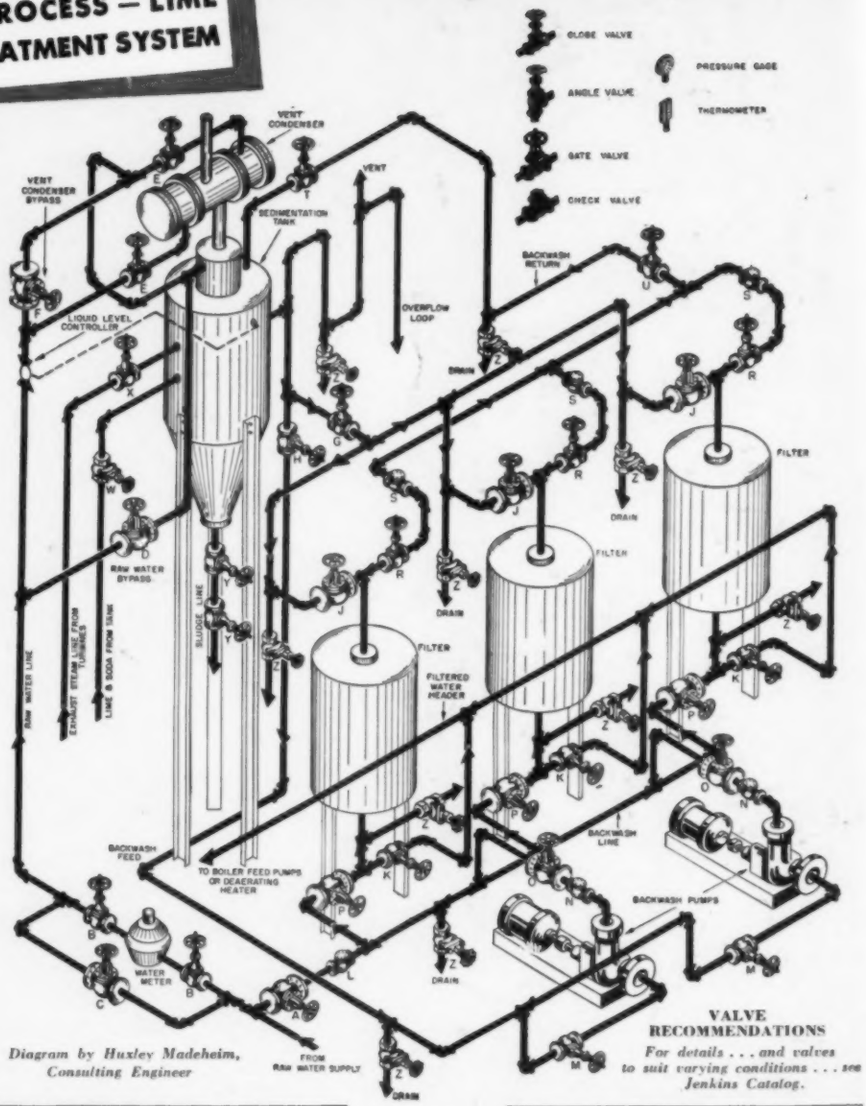

Diagram by Huxley Madeheim, Consulting Engineer

VALVE RECOMMENDATIONS
For details . . . and valves to suit varying conditions . . . see Jenkins Catalog.

Code	Quan.	Jenkins Valves	Service
A	1	Fig. 142 All Iron Globe	Raw Water Control for Backwash
B	2	Fig. 100 All Iron Gate	Raw Water Meter Shutoff
C	1	Fig. 142 All Iron Globe	Meter By-Pass
D	1	Fig. 142 All Iron Globe	Manual Raw Water Admission
E	2	Fig. 100 All Iron Gate	Vent Condenser Shutoff
F	1	Fig. 142 All Iron Globe	Vent Condenser By-Pass
G	1	Fig. 100 All Iron Gate	Treated Water Feed to Filters
H	1	Fig. 100 All Iron Gate	Treated Water Feed to Backwash Pumps
J	3	Fig. 142 All Iron Globe	Treated Water Controls to Individual Filters
K	3	Fig. 100 All Iron Gate	Treated Water Shutoff to Filtered Water Header
L	1	Fig. 295 All Iron Check	Prevent Backwash Flow into Raw Water

Code	Quan.	Jenkins Valves	Service
M	2	Fig. 100 All Iron Gate	Backwash Pump Suction Shutoff
N	2	Fig. 295 All Iron Check	Backwash Pump Discharge Check
O	2	Fig. 142 All Iron Globe	Backwash Pump Control
P	3	Fig. 142 All Iron Globe	Backwash Control to Individual Filters
R	3	Fig. 100 All Iron Gate	Backwash Shutoff Individual Filters
S	3	Fig. 295 All Iron Check	Prevents Back Feed from Sedimentation Tank
T	1	Fig. 100 All Iron Gate	Backwash Ret. Shutoff at Sedimentation Tank
U	1	Fig. 100 All Iron Gate	Backwash Return Shutoff at Filters
W	1	Fig. 75D All Iron Globe	Lime & Soda Feed Control
X	1	Fig. 651 I.B.B.M. Gate	Exhaust Steam Shutoff
Y	2	Fig. 100 All Iron Gate	Sludge Line Shutoff
Z	10	Fig. 75D All Iron Globe	Drains

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PROGRESSIVE ARCHITECTURE

PENCIL POINTS

DECEMBER 1946 12

VIEWS: Letters 8

JOBS AND MEN: Men Wanted; Jobs Wanted 10

THIS MONTH: Our Authors; Next Month 14

NOTICES 16

THE PLANNING OF A MAGAZINE: Editorial 39

INDUSTRIAL PLANT: Boeing Aircraft Company, Renton, Washington; The Austin Company, Engineers and Builders 40

SCHOOL: Proposed Central Grade School, Williston, Vermont: Freeman-French-Freeman, Architects 50

CHURCH: Chapel of St. Francis, Pampulha, Brasil; Oscar Niemeyer, Architect 52

RETAIL STORE: John Ward Men's Shoe Store, New York City; Julian Von Der Lancken, Architect, Raymond Loewy Associates 56

HOUSE: Near Barrington, Illinois; Schweikher and Elting, Architects 61

HOUSE: At Whitestone, Queens, New York City; Gannett Herwig, Architect 65

MATERIALS AND METHODS

MECHANIZATION OF THE HEARTH. EVOLUTION OF THE MODERN KITCHEN: by Sigfried Giedion 69

STANDARD SPECIFICATION FOR CONCRETE CONSTRUCTION: by James D. Beacham, Architect 76

REVERSE CYCLE HEATING: The "Heat Pump" 81

FROM THE TECHNICAL PRESS: Technical reviews and digests of articles in other magazines, by John Rannells 82

MANUFACTURERS' LITERATURE: Current manufacturers' publications 83

BUILDING PRODUCT FACTS: Open-web Steel Joists: (Part III) 85

REVIEWS: Book Notes by Tibor Freesz, Davidson-Smull, Lawrence E. Mawn 94

GUIDE: To Published Work 98

OBSERVATIONS: by Thomas H. Creighton 132

COVER: Photograph by Boeing Aircraft Company; composition by Gene Hawley

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FLOORING

SELECTION OF THE PROPER THICKNESS IN RESILIENT FLOORING

How thick must a resilient flooring be to provide satisfactory service under a given set of conditions? This question occurs frequently, especially when the architect has reason to believe that the service requirements do not demand the thickest linoleum or resilient tile available.

In the early days of resilient flooring, it was common practice to specify either ¼" or 6 mm. gauge where linoleum was used for commercial work. Linotile, rubber tile, and asphalt tile were made only in ¼" thickness while cork tile was not manufactured less than ½" thick.

As manufacturing methods have improved and years of service have shown the durability of these resilient flooring materials under varied amounts and kinds of wear, it has become evident that for most commercial installations, a ⅛" thickness in linoleum or resilient tile is adequate.

Lacking first-hand knowledge of the comparative durability of improved resilient floorings such as have been available for the past several years, some architects have been inclined to continue to specify heavier gauges with the idea of having a liberal safety factor even though they would have preferred to reduce costs by using a thinner flooring material.

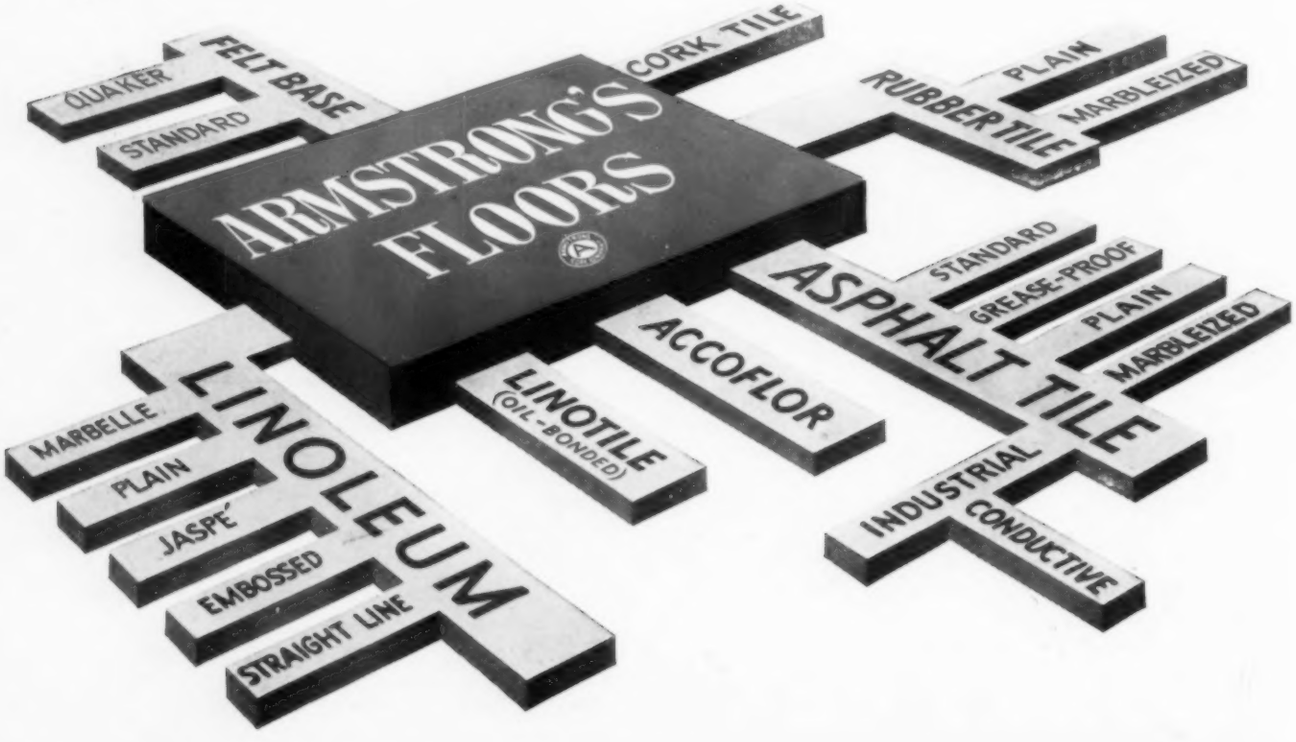
SERVICEABILITY OF VARIOUS GAUGES

To help clarify the situation in the minds of architects and to aid them in specifying floorings to meet various service conditions, the Armstrong Cork Company presents the following brief explanation of thicknesses and recommended uses of its linoleum and resilient tiles.

Most resilient tiles are offered in ⅛" and 3/16" thicknesses. Two exceptions are cork tile, which is made in 5/16" thickness, and Linotile, which is made only in the ⅛" thickness. While asphalt tile and rubber tile are available in two thicknesses, the ⅛" material has proved satisfactory for most service conditions, and this lighter gauge material is recommended for use over both concrete and wood subfloors. The wearing surface of resilient tile floorings is equal to their over-all thickness.

Armstrong's Linoleum is manufactured in four thicknesses or gauges: 3/16", ⅛" or Heavy Gauge, 3/32" or Standard Gauge, and 1/16" or Light Gauge. The wearing surface is applied to a burlap backing in the case of the first two gauges and to a felt backing on the two thinner gauges. Both backings are part of the over-all thickness.

The service requirements of most commercial and institutional installations such as offices, stores, and schools are adequately met, under most conditions, by ⅛" resilient tile or Heavy Gauge linoleum. For residences, small shops, and some office interiors, Standard Gauge linoleum is an excellent flooring.



Floors in high style interiors, such as above, are subject to frequent changes to fit new decorative schemes. Often thinner gauges will meet such short-term service requirements.

Where the resilient floor is subject to heavy traffic, such as in hotel, theatre, and club lobbies, it is well for the designer to consider the heavier gauge resilient floorings.

Light Gauge has a wearing surface of .0300, which is ample for temporary installations, low-cost housing, and similar uses.

FACTORS TO BE CONSIDERED

These four factors have an important bearing on the proper thickness of resilient flooring to use: (1) Anticipated length of service, (2) Geographic location, (3) Type of traffic, (4) Cost.

Anticipated length of service varies with the type of installation. For an institution, maximum durability may be the principal requirement, while for some commercial interiors, such as apparel shops, it may be the plan to remodel and redecorate the interior every few years. Thinner gauge floorings will meet the relatively short-term requirements and reduce flooring costs.

Type of traffic has an important bearing on the amount of wearing surface required. Retail store traffic, especially on the first-floor level, involves heavy wear. In offices and areas above street level, the amount and character of traffic often permit savings through the use of lighter gauges of linoleum or resilient tile.

Geographic location is important because of the necessity of meeting climatic conditions and making allowance for unusual wear due to sandy soil, such as would prevail along the seacoast and in various other areas. Where a climate is hot and humid, linoleum is subject to more than average indentation and, therefore, thinner gauges are recommended than might normally be selected. Asphalt tile and rubber tile are not affected by these climatic conditions.

Cost reductions by the use of thinner gauges of resilient tile and linoleum are obvious. It may not always be economy, however, to reduce thickness to the minimum, because labor costs represent a large part of the installed cost of a resilient floor, and the necessity of replacement would more than cancel original savings.

SPECIAL CONDITIONS

Each flooring installation requires individual study. Since it is impossible to set rigid standards for gauge selection to cover all cases, these comments are presented merely as a guide. Armstrong will be glad to give special assistance wherever the specification of the proper gauge is in doubt. The wide experience gained through many years of observing and experimenting with resilient floor installations makes it possible for Armstrong to offer sound recommendations. For assistance on this or any flooring problem, write any Armstrong office or directly to the Armstrong Cork Co., 8912 State St., Lancaster, Pa.

TABLE OF SUGGESTED RESILIENT FLOOR GAUGES FOR COMMERCIAL, RESIDENTIAL AND INDUSTRIAL INSTALLATIONS*

Material	Approximate Thickness, In.	Thickness of Wearing Surface In.	Average Net Weight per Sq. Ft. in Lbs.	Suggested Use
ACCOFLOR	1/64	.018	.50	Light Industrial
ASPHALT TILE	1/8	.125	1.16	Residential and Commercial
	3/16	.187	1.75	Commercial
ASPHALT TILE (Greaseproof)	1/8	.125	1.17	Residential and Commercial
	3/16	.188	1.74	Industrial
CONDUCTIVE ASPHALT TILE (Regular and Greaseproof types)	1/8	.125	.97	Commercial
	3/16	.187	1.45	Industrial
INDUSTRIAL ASPHALT TILE	1/8	.125	.90	Light Industrial
	3/16	.187	1.35	Heavy Industrial
CORK TILE	3/16	.312	.90	Residential and Commercial
LINOLEUM				
Battleship				
3/16-Inch Gauge	3/16	.0148	1.30	Heavy Installations
Heavy Gauge	1/8	.0850	.89	Commercial
Embossed Inlaid				
Heavy Gauge	1/8	.0850	.71	Commercial
Standard Gauge	3/32	.0525	.62	Residential and Light Commercial
Jaspe				
Heavy Gauge	1/8	.0850	.89	Commercial
Standard Gauge	3/32	.0525	.66	Residential and Light Commercial
Marbelle				
Heavy Gauge	1/8	.0850	.92	Commercial
Standard Gauge	3/32	.0525	.63	Residential and Light Commercial
Light Gauge	1/16	.0300	.46	Low Cost or Temporary Installation
Plain				
Heavy Gauge	1/8	.0850	.89	Commercial
Standard Gauge	3/32	.0525	.66	Residential and Light Commercial
Straight Line Inlaid				
Heavy Gauge	1/8	.0850	.91	Commercial
Standard Gauge	3/32	.0525	.62	Residential and Light Commercial
Light Gauge	1/16	.0300	.46	Low Cost or Temporary Installation
LINOTILE (Oil-Bonded)	1/8	.125	.93	Residential and Commercial
RUBBER TILE	1/8	.125	1.24	Residential and Light Commercial
	3/16	.187	1.86	Commercial

*The weights and gauges given in this table are Armstrong manufacturing standards. Slight variations will occur; but for practical purposes, these figures are substantially correct. Accoflor and Linotile are registered trade-marks.

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CHOICE OF OWNERS

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You'll make a hit with both tenants and owners when you specify Servel Gas Refrigerators for the new apartment houses you design or build. Tenants are enthusiastic about Servel because it never makes a sound, never annoys. As 2,000,000 families know, the Gas Refrigerator offers perfect food protection...plus the most modern refrigeration conveniences.

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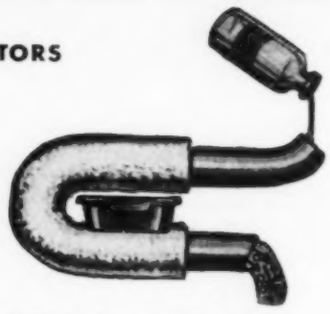
Plan now to provide outlets for Servel Gas Refrigerators in your current designs and construction work. For complete information on this famous refrigerator, consult Sweet's Catalog. Or write today to Servel, Inc., Evansville 20, Indiana.

HERE'S WHY SERVEL IS DIFFERENT

Servel stands out with both tenants and owners because it is the *only* refrigerator that offers permanent silence and lasting dependability. These advantages are the result of a basically different method of operation. Here is a simple explanation of the big difference that makes Servel outstanding.

ALL REFRIGERATORS COOL BY EVAPORATION



When a continuous stream of ammonia or other refrigerating liquid and a continuous stream of air are poured through a bent metal tube, evaporation takes place inside the tube. This cools the outside of the tube and causes refrigeration. The evaporated ammonia goes off in vapor gas. Since in a practical refrigerator the supply of refrigerant is limited, it must be recovered and used again.

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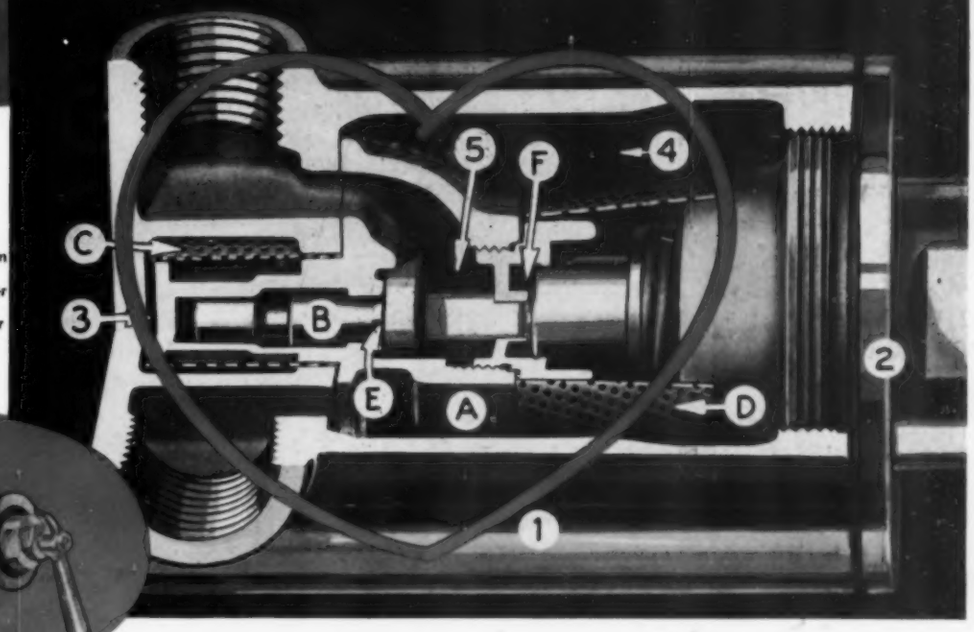
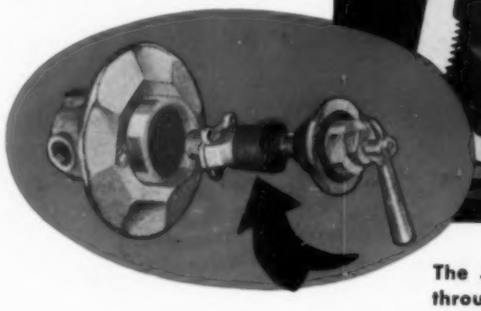
2. Removable bronze bonnet
3. Cold water chamber
4. Hot water chamber
5. Mixing chamber

"Heart-of-Valve" consisting of:

A. Cage carrying operating mechanism
B. Hydraulic-type shuttle valve
C. Bronze screen protecting cold water port
D. Bronze screen protecting hot water port
E. Neoprene cold water valve seat
F. Neoprene hot water valve seat





Maintenance is simple and easy. All working parts are combined in the "heart of valve" unit easily accessible by removing valve bonnet. Old unit can be removed and new unit installed in a jiffy. "Heart of valve" renewal units are available in individual packages.

The Josam Moderator Mixing Valve assures *lasting* shower bathing pleasure through simplicity of construction. A single moving part—the hydraulically operated shuttle valve—keeps hot and cold water "in balance" at the selected temperature and prevents accidental scalding. This shuttle valve is enclosed in the "heart of the valve"—a unit in which all working parts are combined. Even after years of wear or rough usage, there is no need of expensive replacement. All you do is replace the old "heart of valve" with a new one...and the valve is as good as new! The Josam Moderator Mixing Valve is ideal for residences, apartments, schools, colleges, hotels, clubs, institutions, factories, or wherever shower bathing is a regular routine. Fits readily into all standard shower installations. Send coupon below for complete details today!

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VIEWS

AWARD ENTRIES

With this issue, you will receive your Entry Blank to submit your best work of the year for one of the PROGRESSIVE ARCHITECTURE Awards. For information about the awards, read your Entry Blank (Supplement No. 1).

WANTED: GOOD ARCHITECTURE

Dear Editor:

People have had a great desire to build and it is relatively easy to sell them good progressive architecture, but there is nothing to build with and almost no one to build. Labor and material are both very critical. The thing that really hurts at this time is to see material being used to build more and more—! In front of many of these buildings hang "Architects" signs. It is not for want of work that we decry this condition: there is more than enough work for every office to make a living. All we ask is that every office do good architecture. By and large, the thinking layman is ahead of the architectural profession.

We have an interesting condition here that you may not find in most sections of the country. The lumberyards in Austin furnish "plans," finance construction, provide the contractor, sell all the material, sell the appliances, and offer (in their words) a complete building service. Many G.I.'s are taken with this service—and we do mean *taken*. To assist this, the FHA in this area is blind to anything that has not been done before, for at least 20 years, and which is not "safe" architecture.

CHARLES GRANGER, A.I.A.
Austin, Tex.

NOT JUST THE PLANNING

Dear Editor:

The writer was much intrigued with your "Observations" in the September PROGRESSIVE ARCHITECTURE referring to your correspondence with Blank Magazine and certain architects publishing plans for small homes therein. Every architect, I am sure, will agree with Blank Magazine's assertion that "**anything** that contributes to or tends to influence, even in small measure, better houses for the average family, both in design and construction, is a step in the right direction."

But let us consider the motive behind the publishing of these plans. Was it concerned principally with helping the owner to secure a better home and thus add to the attractiveness of the community, or was it the selling of more magazines and a financial profit? There remains considerable doubt in my mind that Blank Magazine was consumed with a desire to help the man of modest means secure a better designed home.

The objections to the plan service of Blank Magazine, at least from an architect's viewpoint, are:

1. It creates in the mind of the public an absurd idea of the value of a set of plans and specifications and, in consequence, the value of an architect's service.

2. As you so aptly state in your letter to Blank Magazine, "there are going to be some pretty ghastly simulations of your stock designs built in the wrong places all over the country." Such plans are sometimes bought by the man desiring to build a home, but more often by a builder because they are cheap and may aid him in securing a contract from the owner.

3. Another objection is that although the plans may be excellent to start with, by the time the contractor gets through making changes, the result is anything but satisfactory to the owner. The magazine may sell enough of these plans to make it profitable, but the proportion of homes actually built from said plans is very small, and those erected are usually by a builder and repeated a number of times with slight variations.

4. So, in the final analysis, the builder is benefited rather than the owner, who has no one looking out for his interests; the plan is probably not suited to the site; and those things that make a home attractive are omitted or mishandled.

We also agree to the statement of Blank Magazine "that the architectural profession, like doctors, has a social obligation to help provide a better environment for families of modest means." But cheap plan service is not the proper method for securing a better design for the small home. There must be someone in the picture who has good taste, a knowledge of construction, and is safeguarding the owner's interests. Such a service is rendered by an architect and cannot be bought for $5 or $10. The most important part of any building project is not just the planning but the selection of site, contractors, colors, and many other details that enter into a building.

Unfortunately, many architects sidestep the designing of small homes, but it is a responsibility that they should face squarely and assume, even at some sacrifice. Not every architect is qualified to design small homes. In fact, they are rather few and far between; therefore, these should be sought out and encouraged to help in the designing of small homes. If properly handled, this field can even be made profitable.

OSSIAN P. WARD
Louisville, Ky.

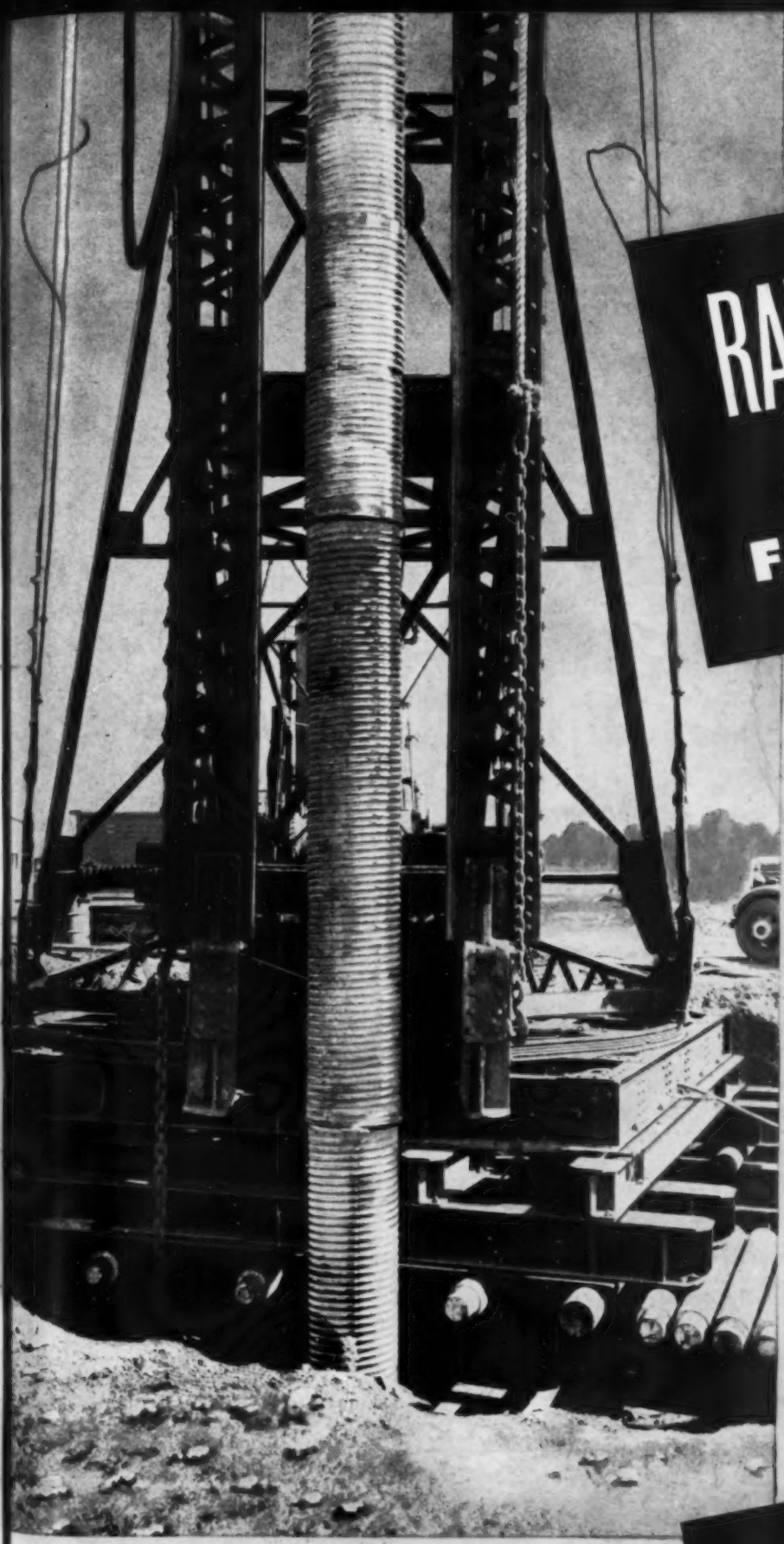
AT LEAST HONEST

Dear Editor:

Your "Observations" in the September issue are most entertaining and suggest a serious idea. Perhaps there is a good deal to be said for the opinion of "Architect B." Perhaps it is "better to give these people some exposure to decent design;" and wouldn't it be an excellent program for PROGRESSIVE ARCHITECTURE to run a competition for the best six, eight, or ten designs for a certain size "Today's House," which is actually designed and presented with the idea in mind of having a small-town builder construct the building. Offer prizes for the number of designs chosen, thus giving the architect compensation for his work; the losers lose as in any competition. Take perhaps a minimum of six designs if ten good ones were not forthcoming. Give the competition plenty of spread and then go ahead and sell the plans over the counter (or let Gimbel's take over). So what if Blank Magazine thought up the idea—it has some good points, and PROGRESSIVE ARCHITECTURE's designs, at least, will be honestly done.

HUGH MCK. JONES, JR.
Cambridge, Mass.

"I wish I could help you, Mr. Fenton, but she only designs the house—she doesn't go with it!"



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JOBS AND MEN

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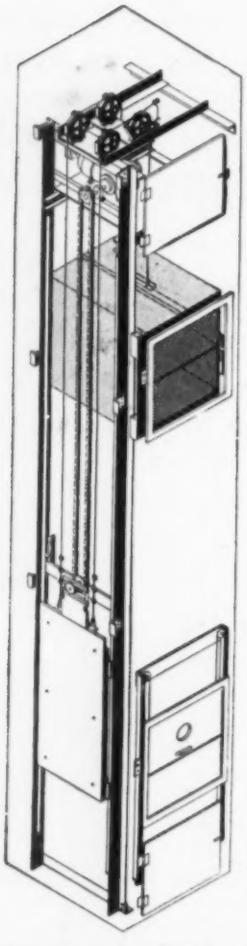
MEN WANTED

OPPORTUNITY—for a graduate architect of vision interested in obtaining his license and fitting himself for practice. If you want wide experience in a small office, write Daniel Perry, A.I.A., Architect, 1213 Main St., Port Jefferson, N. Y.

ARCHITECTURAL DRAFTSMAN — familiar with cut-stone setting diagrams and details. Steady position in pleasant surroundings. State age, experience, and salary expected. Write the Mabie-Bell Company, P. O. Box 2909, Greensboro, N. C.

ROTO-WAITER
by Sedgwick

A new kind of fully automatic electric dumb waiter that never overtravels



The endless chain drive of the new Sedgwick Roto-Waiter makes it the perfect dumb waiter for stores, hospitals, hotels, restaurants, libraries, clubs, schools, banks, factories, residences, etc.—especially for two-stop installations.

The single direction motor helps cut costs by eliminating the need for special control equipment normally required when reversing motors are used—and, by reducing starting torque, it cuts current consumption.

And Sedgwick Roto-Waiters. . . .

1. Never overtravel
2. Are completely factory-assembled-and-tested
3. Require only minimum clearances
4. Have an overload safety device for safe operation
5. Require no heavy load-bearing supports except at the bottom
6. Are easy to install

The table of dimensions shown below lists three standard *counterweighted* Roto-Waiters. In addition, Sedgwick makes an uncounterweighted Roto-Waiter—capacity 150 lbs., car size 24" x 24" x 36"—which is ideal when a dumb waiter is to be installed in limited space as for undercounter use.

STANDARD ROTO-WAITER DIMENSIONS

	2C	3C	5C
Size No.			
Capacity, lbs.	200	300	500
Car width, in.	24"	30"	36"
Car depth, in.	24"	30"	36"
Hoistway width, in.	33"	39"	45"
Hoistway depth, clear in.	27"	33"	39"
Hoistway depth, including doors, in.	29"	35"	41"

So if you are stymied by perplexing lifting and lowering problems involving the vertical movement of material and merchandise—*tell us about them.* And write for complete details and specifications of the new electric dumb waiter that *cannot overtravel*—the Sedgwick Roto-Waiter.

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SEVERAL ARCHITECTURAL DRAFTSMEN, thoroughly experienced, able to prepare preliminaries, working drawings, etc., familiar all phases architectural drafting. Must think, draw along modern trend. Work on postwar theaters and diversified projects. Excellent opportunity for permanent position. Write education, experience, salary, to M. J. DeAngelis, R.A., 1404-1405 Temple Bldg., Rochester, N. Y.

ARCHITECTURAL DRAFTSMAN — capable of developing design of institutional, industrial, and commercial buildings from preliminary sketches to final drawings. Contact P. P. Wagner, Assistant Chief Engineer, or A. L. Becker, 1200 Missouri Pacific Building, St. Louis 3, Mo.

ARCHITECTURAL DRAFTSMAN AND DESIGNER—with initiative and imagination for office 60 miles from New York City. Must be familiar with all phases of architecture. Varied work, congenial surroundings. Permanent position, with excellent salary and opportunity for advancement. *Apartment provided.* Sydne Schleman, Architect, P. O. Box 149, Middletown, N. Y.

CHIEF ARCHITECT OR CHIEF ARCHITECTURAL DRAFTSMAN—for schools, hospitals, and other public buildings in architects' office. Good opportunity for man looking to the future with possible firm membership. State in reply age, education, experience, references, marital status, religion, and salary desired. Write particulars to Hawkins and Walker, Elsby Bldg., New Albany, Ind.

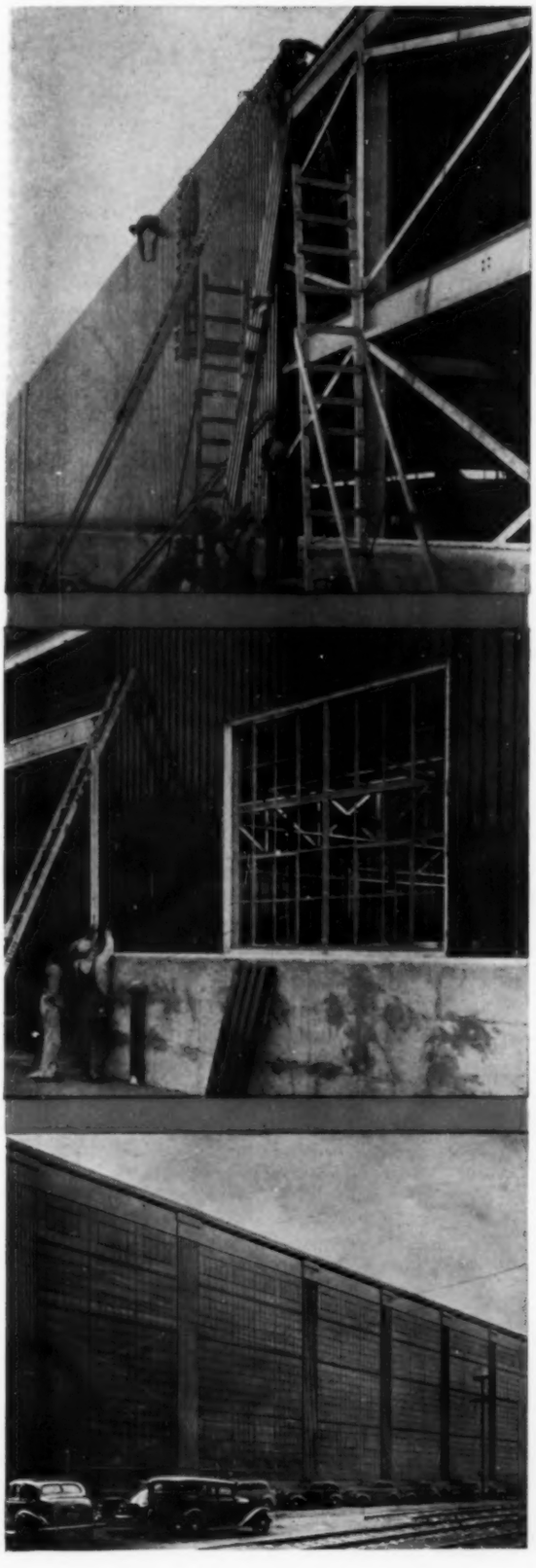
ARCHITECTURAL DRAFTSMAN — capable of preparing sketches and working drawings. Must be experienced. Permanent employment and excellent future for well qualified man. Office in State of Maryland. Box 322, PROGRESSIVE ARCHITECTURE.

DESIGNER—who wishes to do free-lance work wanted by architect specializing in Catholic Church and allied parochial building. Must have unlimited knowledge and experience in Gothic and Romanesque styles, including details. Must be tops. Give experience and compensation per hour expected. Box 323, PROGRESSIVE ARCHITECTURE.

COMBINATION CHIEF ARCHITECTURAL DRAFTSMAN AND SPECIFICATION WRITER —must have good background. Principal work commercial, schools, hospitals, churches. Responsible permanent position for right man with Houston, Texas, firm. Box 324, PROGRESSIVE ARCHITECTURE.

(Continued on page 12)

Steel framework gave birth to Q-PANEL WALLS



WEIGHT
7 pounds per square foot

INSULATION VALUE
equals 12-inch dry masonry

ERECTION SPEED
50 square feet every 9 minutes

Q-PANEL

Q-PANELS, made by the H. H. Robertson Company, of Pittsburgh, Pa., are wall-building units two feet wide and up to 25 feet long, being a fluted section and a flat section separated by 1½ inches of insulation. Steel or Galbestos is usually used, though stainless or aluminum are also frequent.

Q-Panels are delivered to the job cut to fit and are assembled on the steel framework with six bolts. So fast is construction that an acre of wall has been erected in three days.

Construction is dry, clean, noncombustible and the finished wall has thermal insulating value equal to a foot-thick, dry masonry wall.

Architects have found great leeway of expression in combinations of texture and color. Flat and fluted sections can be combined to produce striking patterns of light and shade.

The light weight, seven pounds per square foot, introduces substantial economies. For details write:

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JOBS AND MEN

(Continued from page 10)

CHIEF ARCHITECT—experienced on design and layout of industrial buildings for New York office of large industrial engineering and construction company. Box 327, PROGRESSIVE ARCHITECTURE.

JOBS WANTED

DRAFTING WORK WANTED — structural plans for architects and engineers. Shop plans for steel fabricators; bending details and bar schedules for concrete work; mechanical designs, details, and developments. By competent, registered engineers. Georgia Detailers Association, P. O. Box 191, East Point, Ga.

ARCHITECT—college graduate, 25 years' general experience in leading positions and as principal; specifications, field experience, coordinator. Would like connection with moderate sized office as manager or chief draftsman in Los Angeles or vicinity. Box 320, PROGRESSIVE ARCHITECTURE.

STRUCTURAL ENGINEER — M.I.T., available January 1st, will take charge of production of structural drawings and design reports for architect on straight fee or participating basis. Box 321, PROGRESSIVE ARCHITECTURE.

ELECTRICAL ENGINEER—can lay out, design, and write specifications for industrial, commercial, utility, or institutional electrical installations. Registered (Illinois). Box 325, PROGRESSIVE ARCHITECTURE.

GRADUATE ARCHITECTURAL ENGINEER—University of Illinois, desires position in architecture or structural engineering. Two years' architectural design; two summers' experience in mechanical engineer's office as draftsman on mechanical and architectural projects. Available in February. Box 326, PROGRESSIVE ARCHITECTURE.

STRUCTURAL ENGINEER—Age 27, single, graduate, registered. Interested in contemporary design and construction; desires connection with progressive architect or corporation as designer, draftsman, and general consultant. Experienced in layout and structural design of commercial and industrial buildings. Southern California location preferred. Box 328, PROGRESSIVE ARCHITECTURE.

ARCHITECTURAL DRAFTSMAN — over 20 years' experience in interstate projects and all lesser buildings. First sketches to completion. Also commercial interiors and fixtures. For experience, dependability, and fitness, U. S. Civil Service, 92%. Will go anywhere; Eastern U. S. preferred. Box 329, PROGRESSIVE ARCHITECTURE.

ARCHITECTURAL DESIGNER—experienced, desires opportunity to work according to principles of Frank Lloyd Wright. Can offer builders and architects ways of increasing business by integrating their work with a complete interior design department. Special interest in interior-exterior low cost residence. Box 330, PROGRESSIVE ARCHITECTURE.

RESIDENTIAL DESIGNER—College graduate, experienced, 27, desires position with small, progressive firm specializing in contemporary residences. East Coast, California, or Latin America. References and design samples can be submitted. Box 331, PROGRESSIVE ARCHITECTURE.

YOUNG REGISTERED ARCHITECT, NEW YORK—seeks contact with established architects in expanding Western community. Offers sound knowledge of design, planning, construction, and administration. Desires principal affiliation after short mutually satisfactory employment. Was outstanding student, traveled, conducted own design practice; diversified experience, good offices. Veteran, single. Box 332, PROGRESSIVE ARCHITECTURE.

DESIGNER DRAFTSMAN—twenty years' experience. Desires position with California firm, San Diego vicinity preferred. State whether housing available. Box 333, PROGRESSIVE ARCHITECTURE.

Back to Peace-Time Cleaning Efficiency

Before the war, the majority of the biggest, newest and best office buildings, schools, theatres and hotels were equipped with Spencer Central Vacuum Cleaning. The speed of perfect cleaning, low maintenance costs and all-round reliability of the system was endorsed by architects, engineers and owners everywhere.

Spencer is coming back — with rapid strides. If you are planning any building — make simple investigations and comparisons with other methods before you decide.

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307D

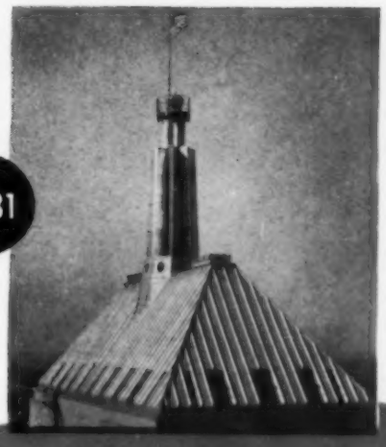
1929

Nineteen years ago Alcoa Aluminum window sills were installed throughout the Chrysler Building, New York, N.Y.

1929

Another veteran Alcoa installation—967 cast aluminum spandrels on the Koppers Building, Pittsburgh, Penna.

Thirteen years ago Alcoa Aluminum flooring and railings on this bridge saved one and one-half million pounds of dead weight.



1931

Fifteen years of trouble-free service is the record of this aluminum roof on the First National Bank Building, Oklahoma City, Okla.

1933

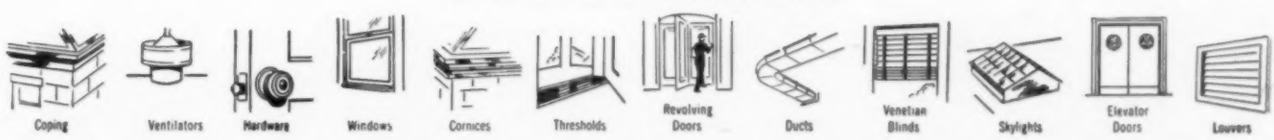
TAKE A LOOK AT THE PERFORMANCE RECORD OF *Alcoa Aluminum*

There's plenty of proof that it pays to use Alcoa Aluminum in building construction. Just take a look at its performance record.

For instance, aluminum windows, roofs, ornamental work, are still giving excellent service after 15 to 20 years. There's a church steeple erected 20 years ago, which is in as good condition now as when it was installed.

Look around and you'll find aluminum windows, doors, screening and spandrels; you'll see coping, skylights, roofs and cornices made from Alcoa Aluminum. Check some of these installations yourself and you'll see why Alcoa Aluminum should be included in the plans of your future buildings. Write for our booklet —"Let's Look at the Record". ALUMINUM COMPANY OF AMERICA, 2198 Gulf Building, Pittsburgh 19, Pa.

THE MOST VERSATILE OF ALL BUILDING MATERIALS



ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

IN EVERY COMMERCIAL FORM

THIS MONTH

The members of the firm of Freeman-French-Freeman, architects of Burlington, Vermont, have been in partnership since 1937. **William W. Freeman** attended Cornell University for his architectural training and post-graduate work in architectural design and history. He became assistant supervisor of art for the Burlington public schools, then in 1934 formed a partnership with **Ruth Reynolds Freeman**, who also was trained in Cornell's College of Architecture. During the war Freeman served as a commissioned officer in the Navy, holding the rank of Lieutenant Commander at the time of separation, while Mrs. Freeman went to Washington and worked with Faulkner & Kingsbury and with Rose Greely. Prior to joining the Freemans, **John C. French, Jr.** was associated with the firms of Brainard & Leeds, Bigelow & Wadsworth, Jens Frederick Larson, and Frank Lyman Austin. He is a graduate of Wentworth Institute.

The work of **Paul Schweikher** and **Winston Elting**, architects of the Illinois house shown on page 61, has been influenced particularly by the ideas and teachings of Louis Sullivan and Frank Lloyd Wright. The work of their firm, of which the late Theodore Warren Lamb was a founder with Schweikher in 1933, has included notable commercial and institutional work as well as some 50 houses in and near Chicago. Schweikher received his training at School of Engineering, University of Colorado; Armour Institute of Technology; Yale University; and also from European travel, as a Natcham Fellow. Elting studied architecture at Princeton, where he graduated in 1929, L'Ecole des Beaux Arts in Paris, and the American School at Fontainebleau, also traveling in Europe and North Africa before returning to work in Chicago and Washington offices. As both served in the Navy during the war, their office was closed from 1942 to 1945, when they resumed practice under the present firm name, Schweikher & Elting.

(Continued on page 16)

JOHN C. FRENCH, JR. RUTH R. FREEMAN WILLIAM W. FREEMAN

PAUL SCHWEIKHER WINSTON ELTING

NEXT MONTH

● Supplies and products promised builders in the new year will get our full attention in the January issue, comprising a 65-page survey and authoritative analysis of available structural materials and equipment. The design challenge of all this information will be spotlighted in the interest of alert members of the profession, who will recognize the need for restudy of many of the tenets of building construction.

● Latest information from manufacturers, research findings, up-to-date forecasts of 1947 supply and demand are being examined and analyzed for our readers by Frank G. Lopez, technical editor, and a competent group of structural experts each assigned a specific category of products. These authorities will offer, for each of thirteen broad classifications of materials and equipment, an analysis of producers' reports, a tabulated list of products being announced for the new year, and notes on the characteristics and usefulness of each.

● The contributing authors and consultants, who will discuss the available materials from the standpoint of usefulness in the structure, include **Fred N. Severud**, Consulting Engineer; **Hermann Field**, Architect; **Walter Sanders**, Architect; **A. Gordon Lorimer**, Chief Architect, Department of Public Works, City of New York; **Ben John Small**, Architect and Specification Writer; **Charles Haines**, Architect; **Clifford Strock**, Editor, "Heating and Ventilating"; **Kenneth C. Welch**, Architect.

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of better, longer lasting floors

During the past year, this five-point pledge has been the mainspring of Tile-Tex policy.

New plants have been built and are now in production. Research facilities to assure new and better products have been sharply expanded. New techniques have been developed to guard the uniformity of Tile-Tex quality. Programs designed to lift installation standards and make effective intelligent maintenance service to the architect's client are in full swing.

This basic Tile-Tex pledge will continue to protect you and your client. It enables you to specify Tile-Tex Asphalt Tile with the full assurance that your client will get maximum satisfaction from the floors in his building.

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LOOK TO Tile-Tex IN '46
FOR THE BEST IN FLOORING

ASPHALT TILE-TEX TILE

THIS MONTH

(Continued from page 14)

The architect of the provocative church in this issue is **Oscar Niemeyer Soares**, one of Brasil's most distinguished younger designers. The church is one of several buildings by Niemeyer around the artificial lake, Pampulha, near the great planned city, Belo Horizonte, whose mayor commissioned this architect to design about ten large and small buildings. His internationally known Yacht Club, Casino, and *Baile*, or dine-and-dance restaurant, are all at Pampulha. His many buildings in other parts of the country include a hotel at Ouro Preto, a day nursery, his own home and other residences in Rio de Janeiro. He also was one of the architects of the famed Ministry of Education and Health there, for which Le Corbusier was consultant; and one of the architects of the elegant Brasilian Pavilion at the New York World's Fair, 1939-40.

The suburban house situated in view of the graceful Whitestone Bridge (p. 65) is the work of **Gannett Herwig**, native New Yorker who received his education in the city schools and gained professional experience in the offices of Crow, Lewis & Wick and of William Gehron. He conducted his own practice from 1938 to 1942 and now is an associate with Alfred Hopkins & Associates.

Improve Architectural Concrete with CALCIUM CHLORIDE CURING

Three distinct advantages result from the addition of calcium chloride to all concrete mixes. First, calcium chloride adds workability which permits use of less water giving a denser and more durable concrete. Second, it provides high early strength so that forms may be quickly removed for repeated use. Third, calcium chloride supplies automatic "built-in" curing which reduces cracking and crazing.

Explanation of these features is given in Bulletin 28, "Calcium Chloride in Concreting," sent on request.

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La Salle Bldg., 1028 Connecticut Ave., Washington 6, D. C.

Eaton Tower, Detroit
Architects: Louis & Paul Kemper

Better Concrete Faster
with CALCIUM CHLORIDE

OSCAR NIEMEYER

GANNETT HERWIG

NOTICES

JACK FINNEGAN, delineator and designer, who recently returned to California from service in Europe with the U. S. Army Engineers, has opened an office at 255 Bassett St., San Jose, Calif., for design, rendering, and advertising art.

WILLIAM F. DEKNATEL has written to announce his return to architectural practice at 25 E. Jackson Blvd., Chicago, Ill.

JOHN RICHARD HELLMAN announces the opening of an office for the practice of architecture and city planning in Falmouth, Mass.

C. WILLIAM PALMER, veteran of two wars and recently discharged from his duties as Commander in the U. S. Navy, has opened his office for the practice of architecture and engineering at 2675 Penobscot Building, Detroit, Mich.

RONALD WARD, who recently returned to his London office at 33 St. George's Drive after service with the British Army in West Africa, has announced his intention to specialize in hospital design. He has completed a book on the subject and is now compiling additional information.

(Continued on page 18)

It's New!

it's beautiful!

it's edge-lighted

PLEXIGLAS

It's the answer to your demands for distinction in design.

This edge-lighted PLEXIGLAS mural was made by the Endicott Corporation of Boston for the Sheraton Room, the new cocktail lounge of the Copley-Plaza hotel. Achieving elegance as well as dignity, it is the successful working out of an idea you can utilize to advantage in your own plans.

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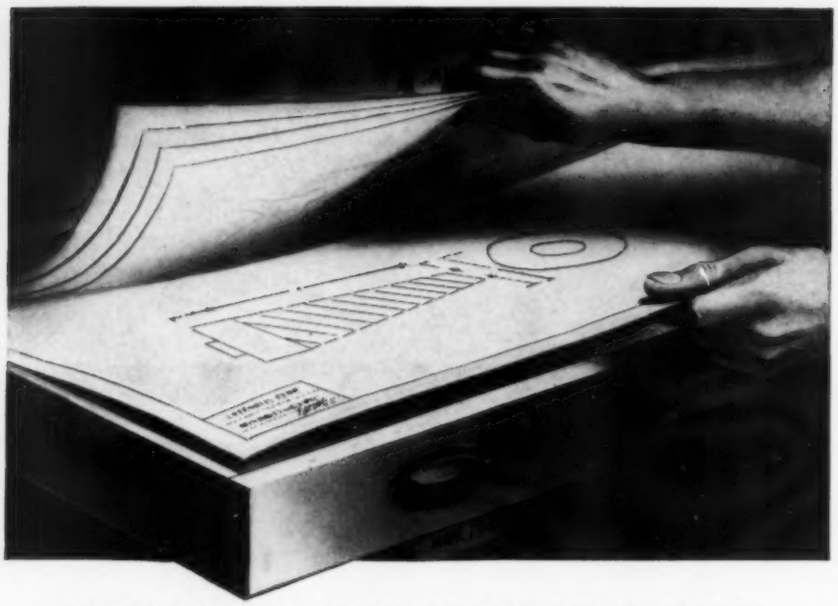

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AMERICA'S STANDARD FOR OVER 25 YEARS

NOTICES

(Continued from page 16)

IVAN M. REYNOLDS and ROSS W. MORRISON, Associated Architects, announce the opening of an office for the general practice of architecture at 740 Hightower Building, Oklahoma City, Okla.

Announcement has been made of the withdrawal of Mr. Yeager from the firm of MILLER, YEAGER & VRYDAGH, and the formation of a new firm to be known as MILLER & VRYDAGH, Architects, with offices at 200 Opera Building, Terre Haute, Ind.

WOOD BROOKS and GILBERT CODDINGTON announce the formation of a partnership for the general practice of architecture under the firm name of BROOKS & CODDINGTON, Architects, with offices at 329 E. Broad St., Columbus, Ohio.

WILLIAM L. VAN ALEN has joined with J. ROY CARROLL, JR. and JOHN T. GRISDALE to engage in the general practice of architecture at 1420 Walnut St., Philadelphia, Pa., under the firm name of CARROLL, GRISDALE & VAN ALEN.

KETCHUM, GINA AND SHARP, Architects, announce the removal of their office from 5 East 57th St. to 227 East 44th St., New York, N. Y.

GEORGE A. EBELING, Registered Architect, has announced the new location of his office at Suite 234, Colonial Arcade Bldg., Cleveland 15, Ohio.

FELIX AUGENFELD, A.I.A., A.D.I., has moved his office of architectural, industrial, and interior design across the street and is now practicing at 119 East 57th St., New York, N. Y.

MAX MERCER has announced the removal of his office at Antioch College, Yellow Springs, Ohio, to the Little Theater Bldg., of the same town. He is engaged in the general practice of architecture.

JAMES A. GILLEN, Architect, has announced the opening of new offices at 724 36th St., Sacramento, Calif.

M. L. BARKER, A.I.A., and G. LAWRENCE OTT, A.I.A., have announced the removal of their offices to 4334 West Pico Blvd., Los Angeles 6, Calif.

GEORGE WHARTON PEPPER, JR., A.I.A., Registered Architect, and MAURICE FLETCHER, A.I.A., and JOHN HOWARD TAYLOR, A.I.A., Associated Architects, announce the new location of their office at the Lewis Tower, 225 South 15th St., Philadelphia, Pa.

ALLEN J. DICKEY, Architect, announces the opening of his office in the Spaulding Bldg., 3115 Wilson Blvd., Arlington, Va.

EDWARD R. TAUCH, JR. has announced the removal of his office to new quarters at 250 East 49th St., New York 17, N. Y.

MOORE & HUTCHINS, Architects, formerly of 11 East 44th St., have moved to 2 West 20th St., New York 11, N. Y.

RICHARD S. BYRD, Architect, has announced the new location of his office at 1315 Marion St., Columbia 23, S. C.

PROGRESSIVE
ARCHITECTURE
ENCIL POINTS

THE PLANNING OF A MAGAZINE

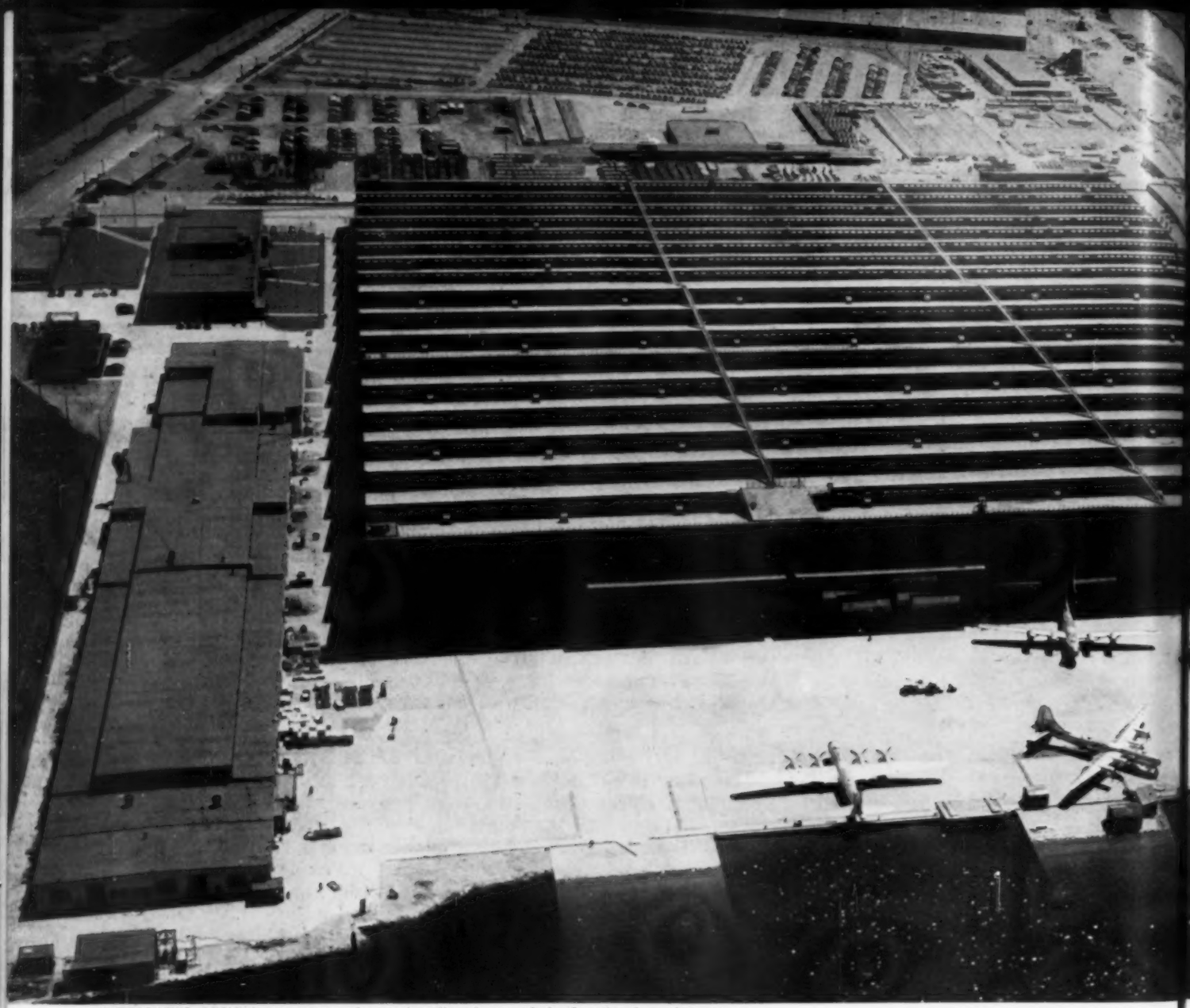
PROGRESSIVE ARCHITECTURE's policy of thorough analysis of the architecture its editors select for publication inevitably means that a limited amount of material can be used each month. Just as an architect reviews a number of excellent materials and selects the ones that best suit a particular design purpose, so we are forced each month to make selections—and, regrettably, rejections—that best suit our publication plans. Let us speak frankly of our procedure in this respect.

Some of the work that appears in PROGRESSIVE ARCHITECTURE is gathered by our editors, some of it is sent to us by photographers; much of it comes unsolicited from you designers. When you have designed something that you think should be published, we are very pleased if you let us see it—a set of prints and a snapshot are usually sufficient. We let you know within a few weeks whether we can publish your building design or planning project or manuscript. Many factors besides excellence of design are involved in our decisions—we try to have a representation of many building types and all regions, for instance. Occasionally a newly arrived item is of such importance that it displaces something previously scheduled. Normally it will be scheduled some months ahead; in due course you will be asked for all the necessary data, and soon your architecture will be described and documented for the benefit of designers everywhere.

There remains the question of good work that space limitations prevent us from scheduling definitely within a reasonable period. There are several alternatives. We could continue holding this material with a dog-in-the-manger attitude (we are too concerned with the interests of the architects involved to do this) ; we might occasionally plan a relief-valve issue, calling it Design Progress Report or some such name, and use a great number of projects briefly (we don't believe this is professional journalism) ; or we can, frankly but reluctantly, explain the situation to the designer so that he can seek publication elsewhere if he wants to (this is our policy).

We have had many expressions of support since we began this series of statements on architectural publishing. One of the most effective ways of demonstrating approval of a magazine is to continue submitting to it your best work. We have no complaint on this score; the purpose of this exposition is to let you know that we intend to give you as a contributor prompt attention, an honest answer, and, let us hope, full professional publication.

The Editors



INTEGRATED DESIGN on a vast scale growing directly out of the functional requirements.

INDUSTRIAL PLANT

FLEXIBILITY that can cope with changing needs is an important and increasing trend in progressive architectural design. During the war this consideration was put to the most urgent test, and nowhere was its success more crucial than in the production of prime war materiel. The Boeing-Renton plant is, perhaps, the supreme example: an almost ideal site . . . a precise ordering of the several units on the site for speedy flow-line production on a vast scale . . . preplanned flexibility that allowed swift conversion to meet shifts in wartime exigencies . . . rationalized construction and quality systems of control that produced near-optimum conditions for working.

BOEING AIRCRAFT COMPANY, R

When converted to B-29 production, this factory at Renton constituted the final assembly unit. Subassemblies were brought to the plant and fed into simply organized flow-production lines, at the end of which finished bombers rolled out of the three great doors on the north for camouflage treatment and test on the adjacent airfield.

The site proved advantageous in almost every respect. The prime requirements were sufficient space, nearness to spur tracks and freight-truck facilities, and (since the plant was originally schemed for production of seaplanes) a location adjacent to fresh water that was navigable—for ship movement, if necessary. As shown in the plot plan,

All photographs are by Boeing Aircraft Company except those that are specially credited.

RENTON, WASHINGTON

THE AUSTIN COMPANY, Engineers and Builders

all these requirements were present in the site on the shore of Lake Washington. Not the least of its advantages was the fact that Government locks at the far end of the lake kept rise and fall of the lake water to a minimum.

Organization of the several units on the site was based quite simply on functional requirements. The huge main assembly building, planned for complete multiple assembly, was placed directly adjoining the lake frontage. Conversion to B-29 production brought the addition of an access way from the lakeside apron across the adjacent waterway to the airfield on the far side. Secondary buildings—administration, personnel, and various warehouses and shops—were located at the sides and far end of the main assembly building.

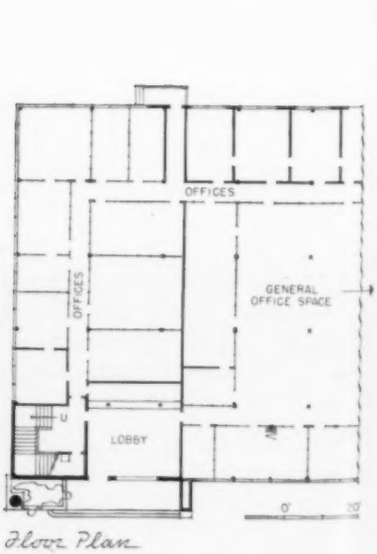
To provide maximum control and protection, the administration building is placed near the one public street that borders the property. Parking for employees' cars and busses occurs in the same general area, adjoining the personnel building.

The latter houses all of the plant-personnel facilities including a bank and post office. The storage and equipment building and the separate cafeteria—a development that came after this country's entry into the war—are located in space that was originally assigned to storage warehouses.

MAIN ASSEMBLY BUILDING

BOEING AIRCRAFT COMPANY, RENTON, WASHINGTON

All photos on this spread by P. A. Dearborn



Floor Plan

ADMINISTRATION BUILDING

THE AUSTIN COMPANY, Engineers and Builders

ADMINISTRATION BUILDING

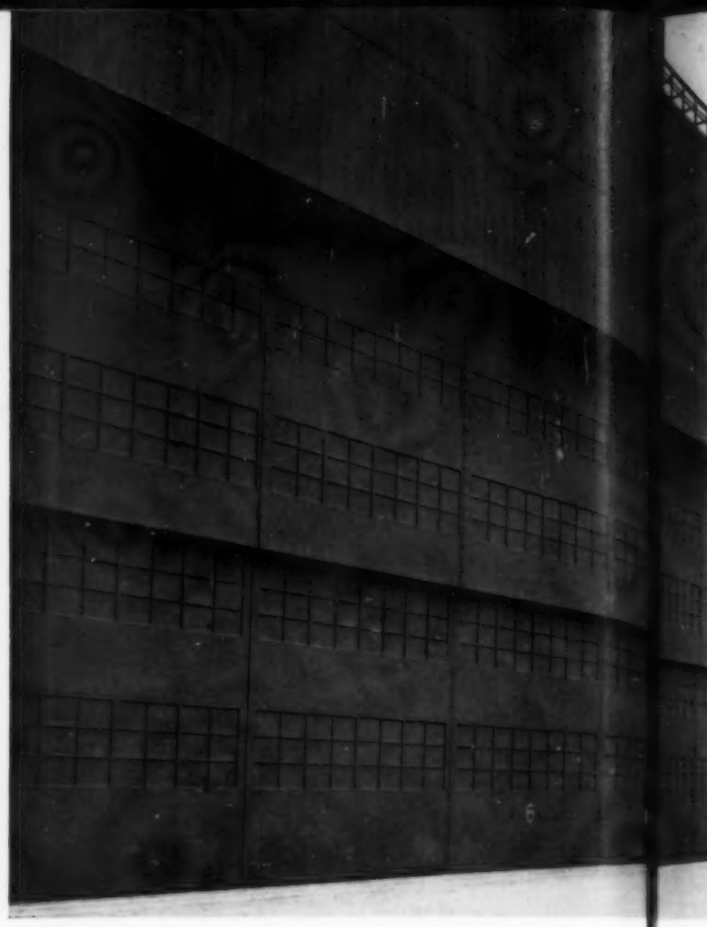
Housing the head offices and general business offices of the plant—chiefly engineering and accounting—the administration building is placed between the entrance gates and the main assembly building.

The partial plan across page indicates the general layout—private and specialized offices around the perimeter, general work space in the center. Since this building and the personnel building were considered as semi-permanent, and wood was plentiful at the time, these buildings are of wood frame with exterior walls of waterproof plywood. The 100-by-300-foot building is laid out in 20-foot bays both ways and is constructed on a concrete slab laid on dirt fill; standard steel sash with muntins omitted is used for the continuous fenestration. Roofing is composition over a layer of rigid insulation laid on roof boarding above open joists.

THE ENTIRE ADMINISTRATION BUILDING is lighted by fluorescent units, providing 50 foot-candles in work areas.

BOEING AIRCRAFT COMPANY

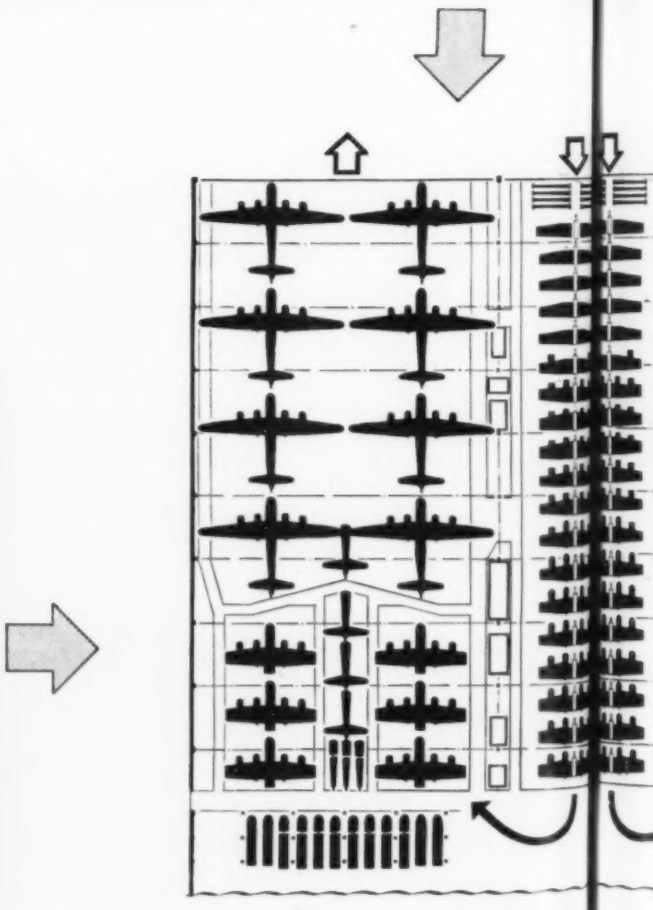
RENTON, WASH.



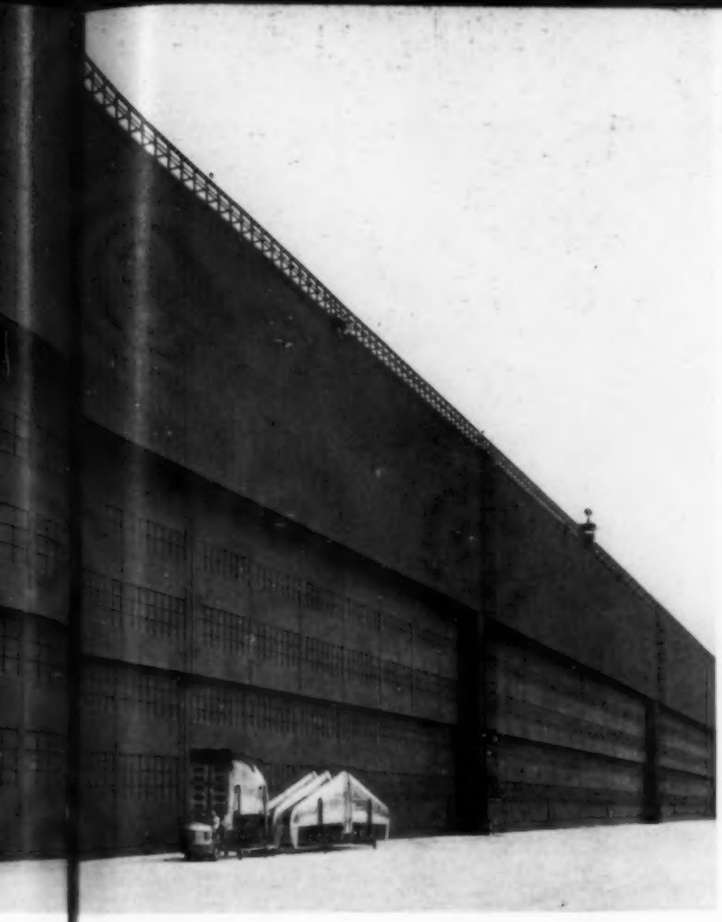
MAIN ASSEMBLY BUILDING

The final assembly area of this vast, 1,100-by-900-foot main building is 650 by 900 feet in area, divided into three 300-foot clear span bays. The southern 450 feet of the building's floor area has a balcony level used for sub-assembly. The ground-floor portion of this southern area is divided into eighteen 25-foot bays north and south and eighteen 50-foot bays east and west; the sub-assembly balcony is divided into nine 50-foot bays north and south and six 150-foot bays east and west. Across the road to the west are shops, from which parts can be brought into the main assembly building at several different points.

P. A. Dearborn



INBOARD WING STRUCTURES are received at the north end of the building and progress down the center of the bay, being progressively fitted out as they travel. They are then transferred, complete with power plants and all installations,

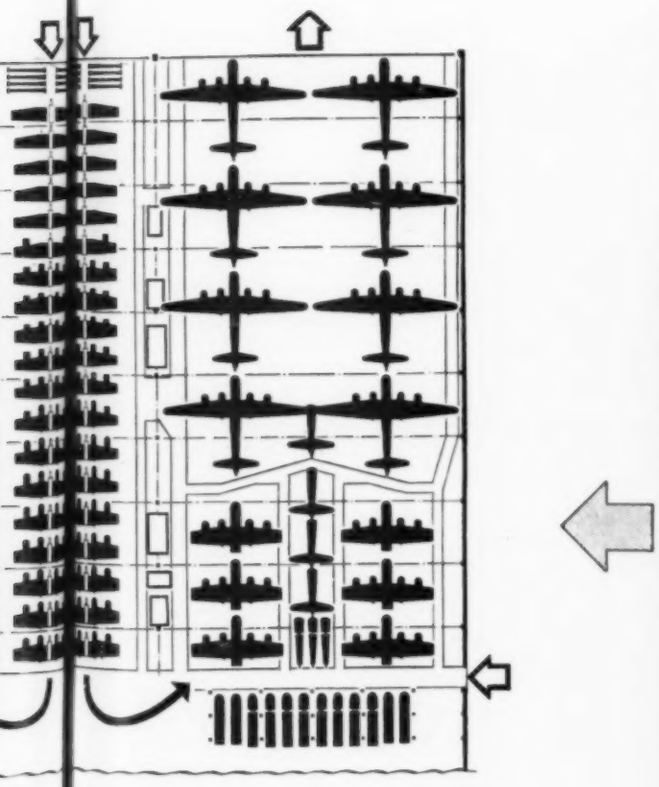


THE AUSTIN COMPANY

Engineers and Builders

STRUCTURE

The main assembly building, framed in steel, is sheathed outside with asbestos-protected metal siding and roofed with composition waterproofing installed over insulation and steel roof decking. The wall-surface material was chosen for its light, fast construction, its high salvage value, and because much of it could be precut at the factory. The huge hangar doors on the opening end are of steel, canopy type, opening vertically for half their height before pivoting action starts; when fully opened, the canopy overhang equals one-third of the height. A section showing the pattern of the trusses in the final assembly area appears on the following spread.

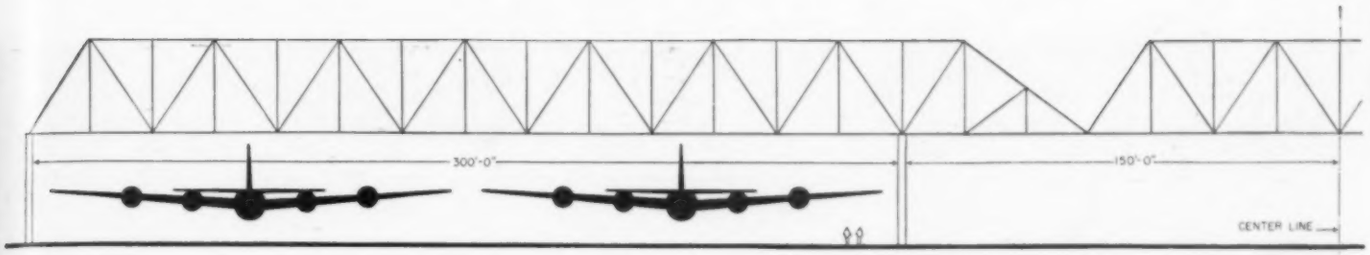


to the adjacent B-29 assembly bays, and attached to fuselage sections which move up from behind. The B-29 tail assembly line joins the process between the three rear stations of each pair of B-29 production lines.

P. A. Dearborn

P. A. Dearborn

CAMOUFLAGE BUILDING at left, **SHOPS** at right, and the north end of the **MAIN ASSEMBLY BUILDING** in center.



BOEING AIRCRAFT COMPANY

RENTON, WASH.

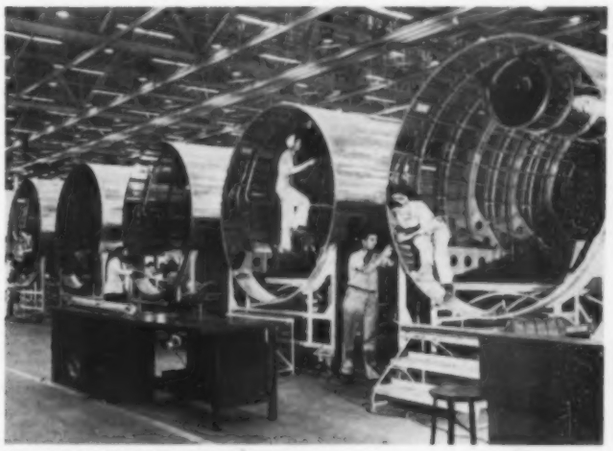
THE AUSTIN COMPANY

Engineers and Builders

To form the three 300-foot clear spans in the final assembly area of the main building, trusses 35 feet in depth are used, with the outer truss members cantilevered 65 feet beyond the supporting columns. The central suspended truss section, 170 feet long, is pin connected to the ends of the cantilevers. Columns from front to back are spaced 65 feet apart. Height to the underside of bottom chords is 45 feet, and there is a complete monorail crossover system to provide maximum flexibility in product movement forward.

HEATING AND VENTILATING

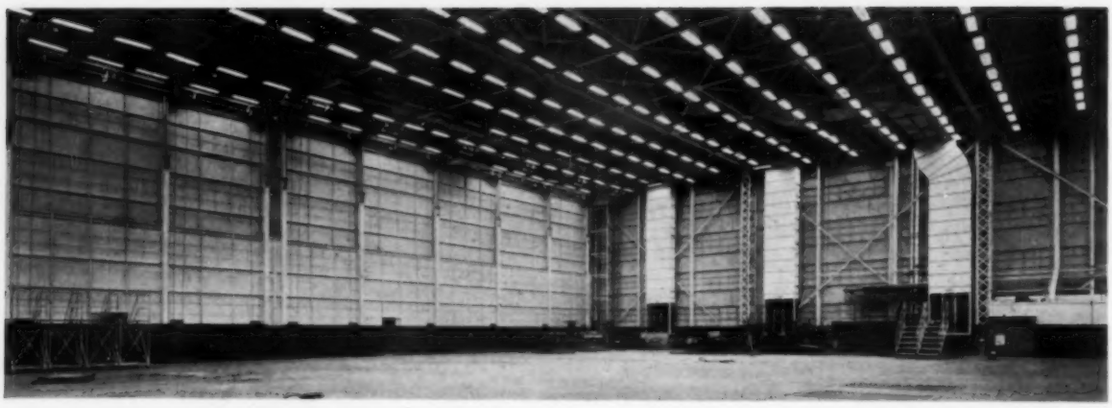
The heating installation for the entire plant, located in a separate building, consists of four 450-horsepower high-pressure steam units. Calculations were based on a minimum outside temperature of plus 10° F. with maximum inside temperatures varying from 55° to 70° F., depending on the kind of space being heated. Direct radiation was used in the administration building, personnel building, and balcony offices. In the main assembly area building, rotary distributing type unit heaters were used, each heater capable of supplying 1,250,000 Btu per hour on an air-handling basis of 19,500 cubic feet per minute. Each heater is designed for 100 percent recirculation and is controlled by pneumatic thermostats with diaphragm control valves. For later blackout conditions, direct air intakes were designed with recirculating control dampers for any desired position from no recirculation to full recirculation. In the sub-assembly balcony area central heaters of the vertical projection type supplemented rotary discharge type units. In the primary area below the balcony, four-way fixed discharge unit heaters were installed. Supplementing these basic systems, highly specialized systems were designed for special-use areas.



BOMB-BAY SECTIONS being fitted . . . . . .

for attachment to wing members . . . . . .

and so on to COMPLETED B-29's.

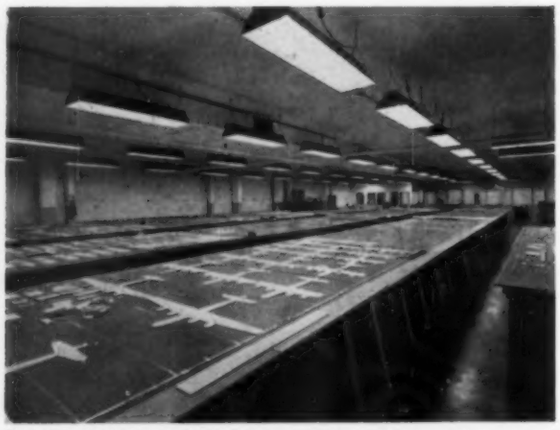


IN THE CAMOUFLAGE BUILDING, vaporproof, high-intensity mercury fixtures produce 25 foot-candles of illumination.

BOEING AIRCRAFT COMPANY, RENTON, WASH.

THE AUSTIN COMPANY, Engineers and Builders

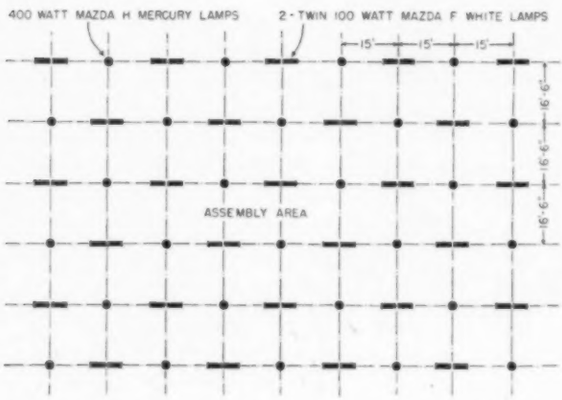
OFFICE SPACE in the administration building, lighted by fluorescent units providing 50 foot-candles at desk height.



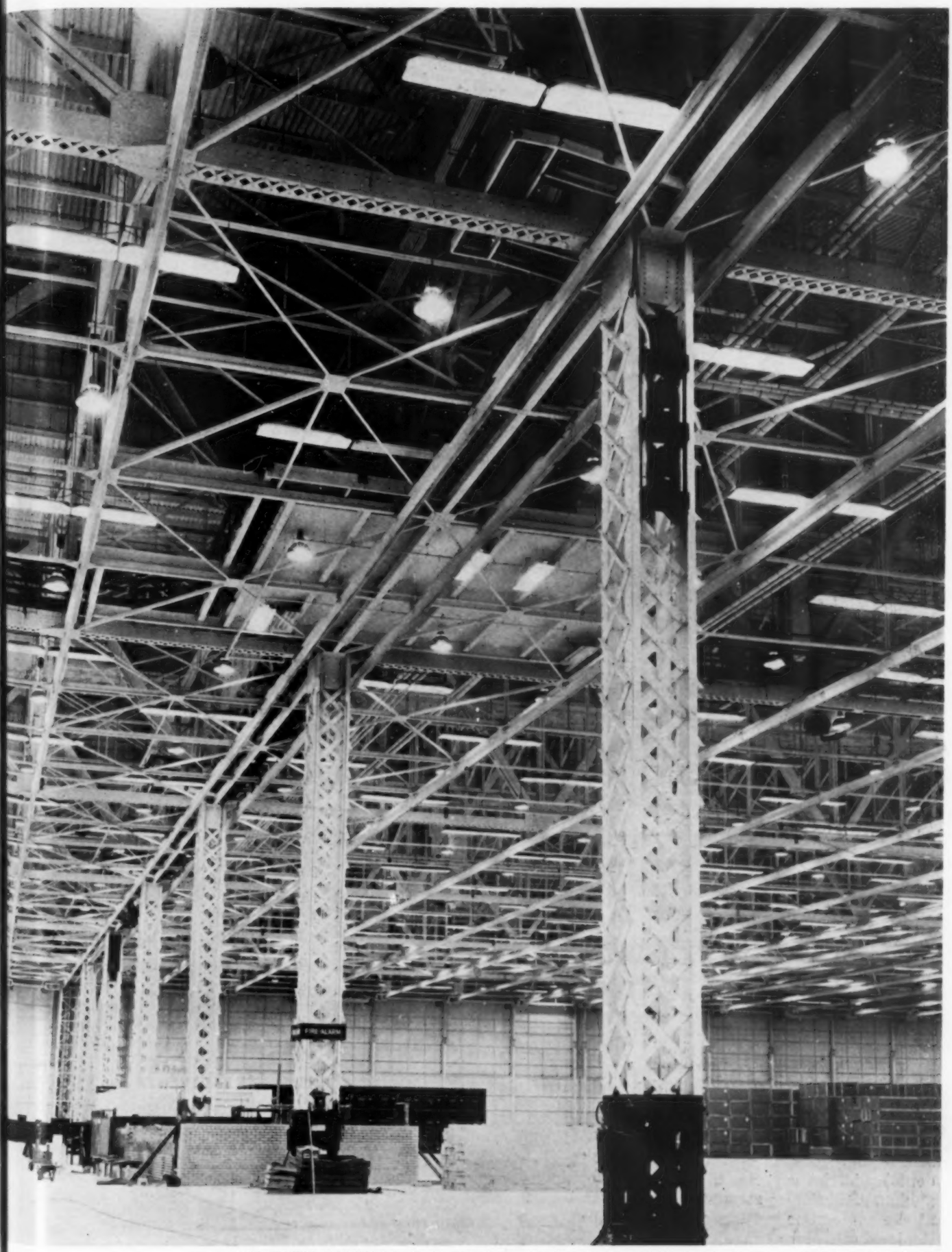
PLANT LAYOUT ROOM with unit fluorescent fixtures; note the blackout panels, inside the windows along the far wall.

LIGHTING

Lighting in the main assembly area was designed to produce 30 foot-candles in service at working height. These outlets, installed at approximately 45-foot height, consist of an alternating, diagonal pattern of high-intensity mercury vapor lamps and pairs of twin-lamp fluorescent units as shown in the diagram below and the photograph across the page. The combination was used for color correction necessary to the blue predominance of the mercury units and consequent distention of color. A further advantage of the use of the longer light source of the fluorescent tube was better diffusion of light at the high mounting levels with less reflection glare from the bright metal used in airplane construction.



DIFFUSED, color-corrected lighting with an intensity of 30 foot-candles is provided in the main assembly area.



THE FINISHED DESIGN is simply a frank organization of plan and structural elements, materials, and equipment.

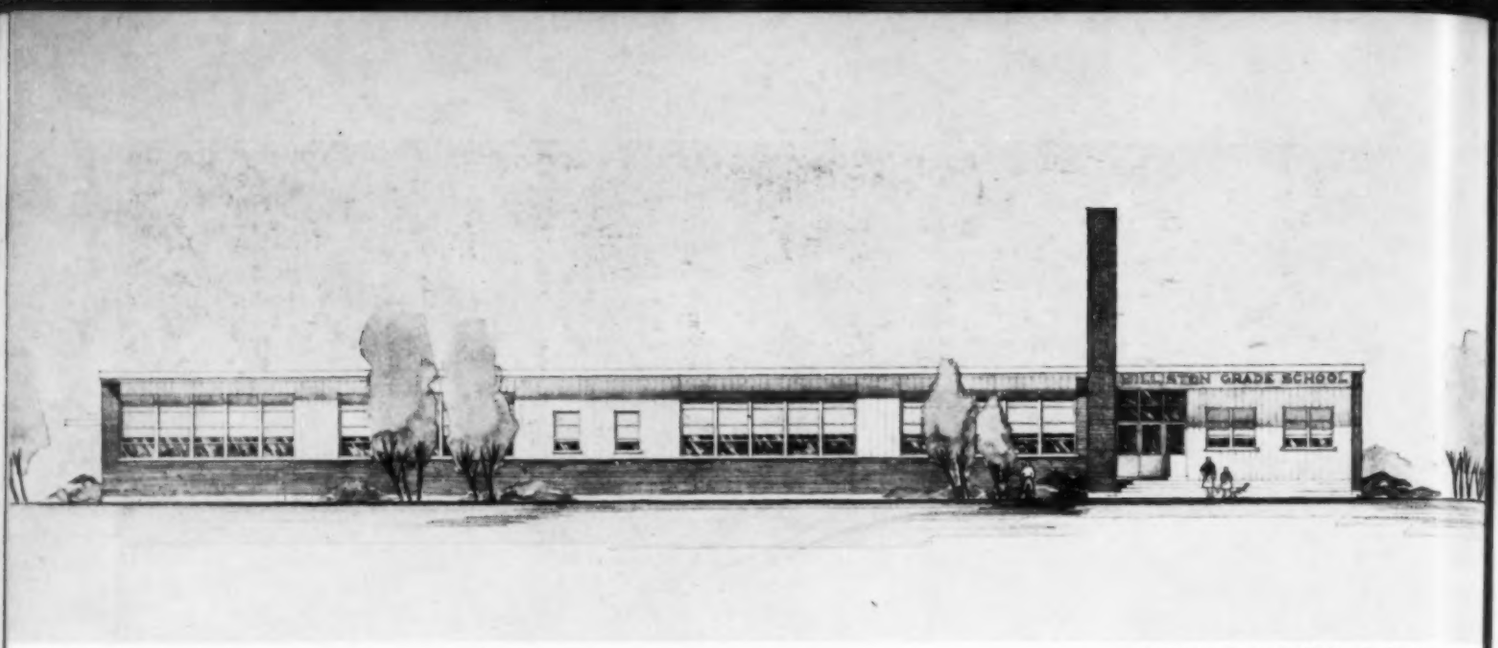


Photo of rendering by Walter E. Lewis

TO CREATE A CHEERFUL ATMOSPHERE, the architects suggest supplementing natural wood and red brick with "positive" colors on some classroom walls.

SCHOOL

PROPOSED CENTRAL GRADE SCHOOL, WILLISTON, VERMONT

FREEMAN-FRENCH-FREEMAN, Architects

IT IS EXCEPTIONAL to find straightforward, contemporary design applied to the problem of the small rural grade school. Herewith is an exceptional exception. In its disarming simplicity, one might almost overlook the fact that it not only incorporates many of the most advanced elements of schoolhouse planning but makes interesting contributions of its own.

PURPOSE

To replace the overcrowded, 60-year-old village school and four typical one-room (8 to 25 students) district schools, thus giving the individual student a better opportunity for proper education at the same time cutting down over-all expense of the local school system. It is also contemplated that the building would be used by local adult groups.

SITE

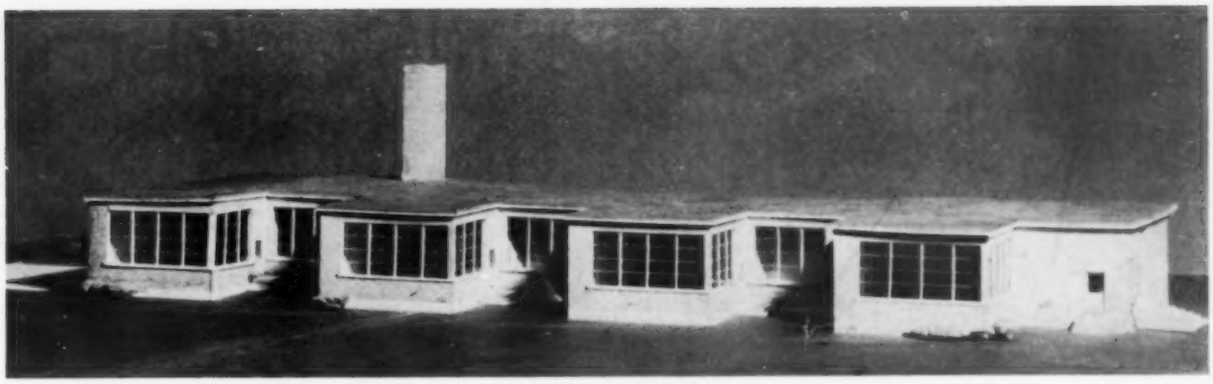
The site of the present village school plus adjacent property—a fairly level, L-shaped parcel 320 feet deep and 400 feet on its longest side, centrally located on the one main road through town.

SCHOOL DIRECTORS' REQUIREMENTS

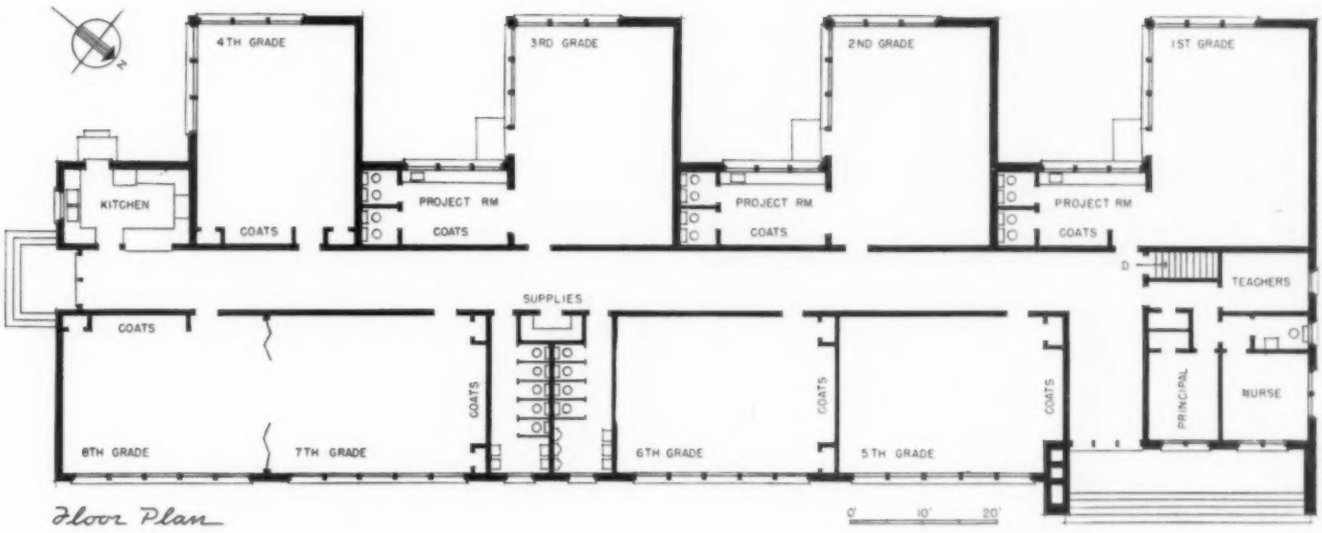
Separation and privacy for Grades 1, 2, and 3, with separate play areas and toilet facilities; a hot-lunch kitchen; standard classroom space for the other grades; offices and nurse's room.

SOLUTION

The four lower-grade classrooms are arranged in



THE PLAN SCHEME for the four lower grades provides good light and maximum flexibility in individual room arrangement.



Floor Plan

right-angle relationship to the corridor, automatically forming separate play yards and well lighted entrance, coat locker, and project space. Separate toilets are provided for the three lower classes. Adjoining the fourth-grade room is the school kitchen. Other classrooms are standard, but with folding partition between seventh- and eighth-grade room to form a general assembly room.

The nurse's room is large enough to provide for isolation of an ill child, in case it is impossible (as it often would be) to reach the child's parents during the day.

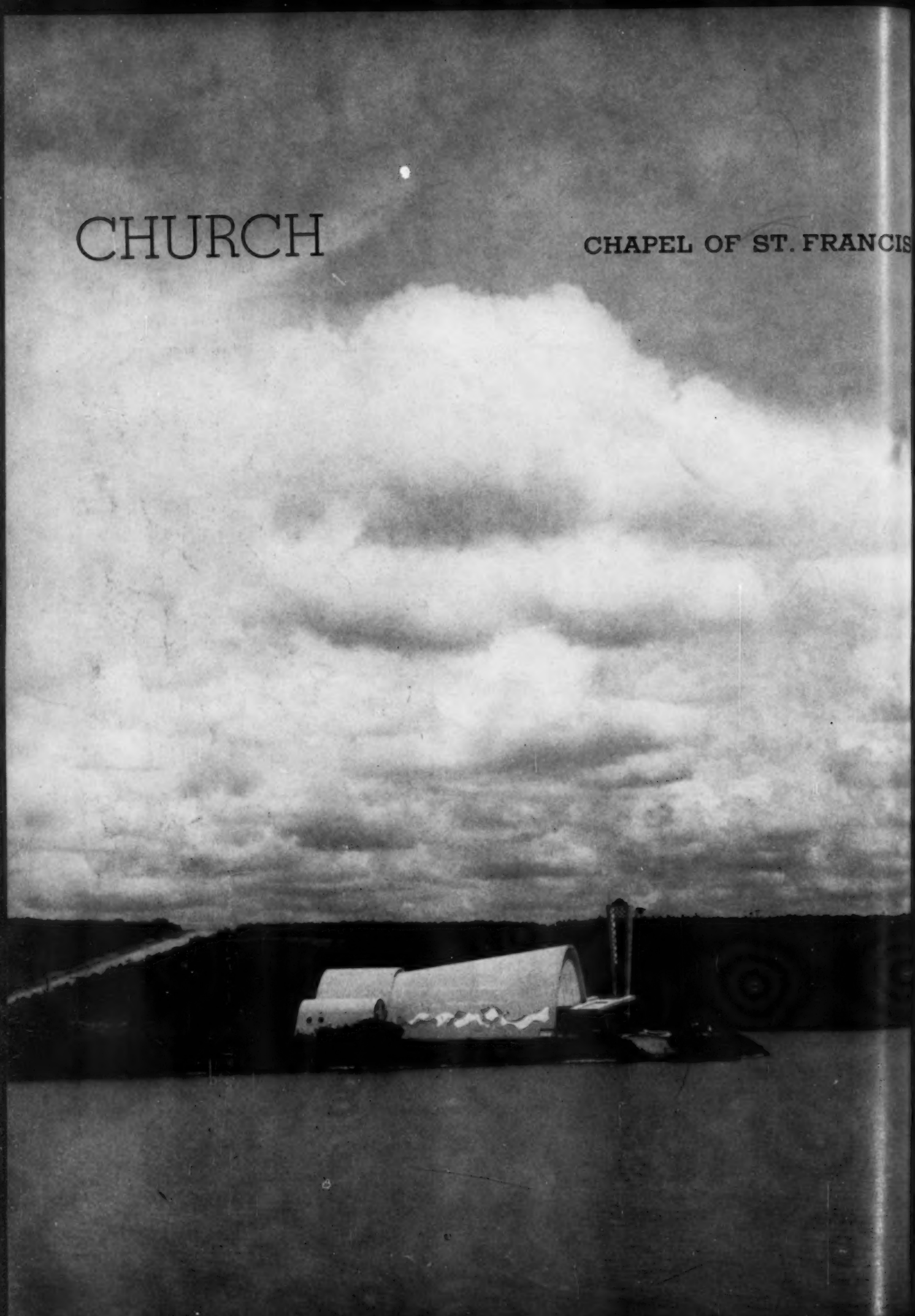
A basement under the north corner (beneath the small offices and entrance corridor) contains the furnace for an oil-fired, low-pressure steam system; unit ventilators would be used in each classroom.

PROPOSED CONSTRUCTION

For economy's sake, it is suggested that as many local materials as possible be used: foundations of reinforced concrete grade beams on concrete piers; exterior walls to window sills, locally produced brick, exposed on the interior; Vermont slate for sills, window stools, etc. Construction between windows: wood with vertical sheathing, and battens for the exterior face. Corridor partitions: masonry, exposed on both corridor and classroom sides. Partitions between classrooms: wood frame, sheathed with native clear pine; ceilings: soft fiber board tile, to assist in acoustic control. The ceiling of the corridor would be furred down to provide space for ventilating ducts, exhaust fans, etc. Floors: hardwood for classrooms, colorful mastic tile for the corridor.

CHURCH

CHAPEL OF ST. FRANCIS PA



We are indebted to DR. LOUIS PARNES for his interest and kindness in bringing the material used for this presentation back with him from a recent trip to South America.

PAMPULHA, BRASIL

OSCAR NIEMEYER, Architect

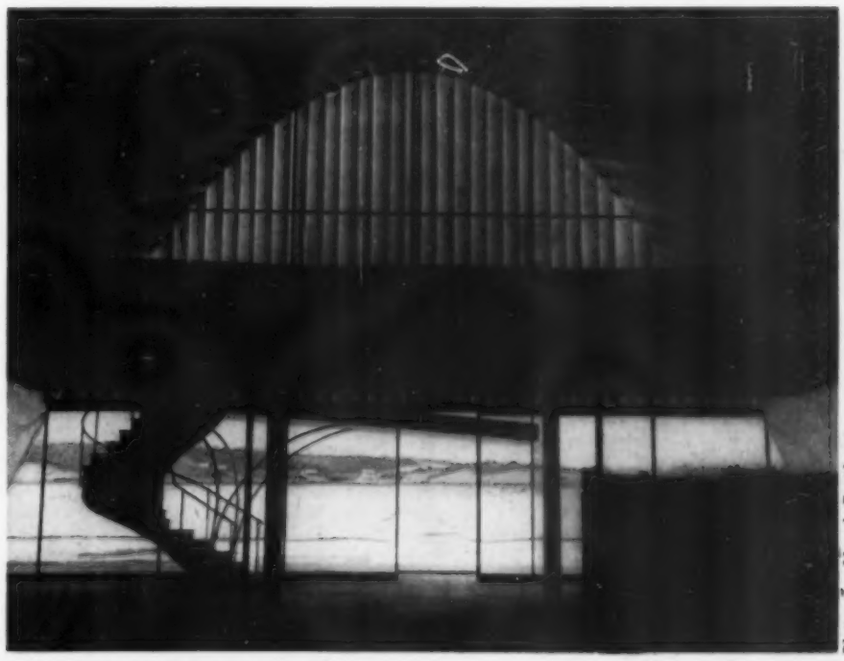
THIS REMARKABLE CHAPEL joins the other distinguished buildings by Oscar Niemeyer —the yacht club, casino, and restaurant—in the new resort town of Pampulha, near the industrial city of Belo Horizonte. It is exciting to come across a church designed for today that attempts to be as sincere and vital and appropriate for our time as the early Gothic church was for its day.

Symbolism is one of the most important functional requirements of church design—the psychological need, so to speak, that supplements and gives meaning to the more routine matters of adequate space allotment and arrangement.

For years, this symbolic emphasis in church design has been variously rationalized within the framework of architectural stylism. It took courage and confidence on the part of the well known architect, Oscar Niemeyer, to re-explore the basis of this need and develop a design based on imaginative use of the structural potentials of today's building techniques.

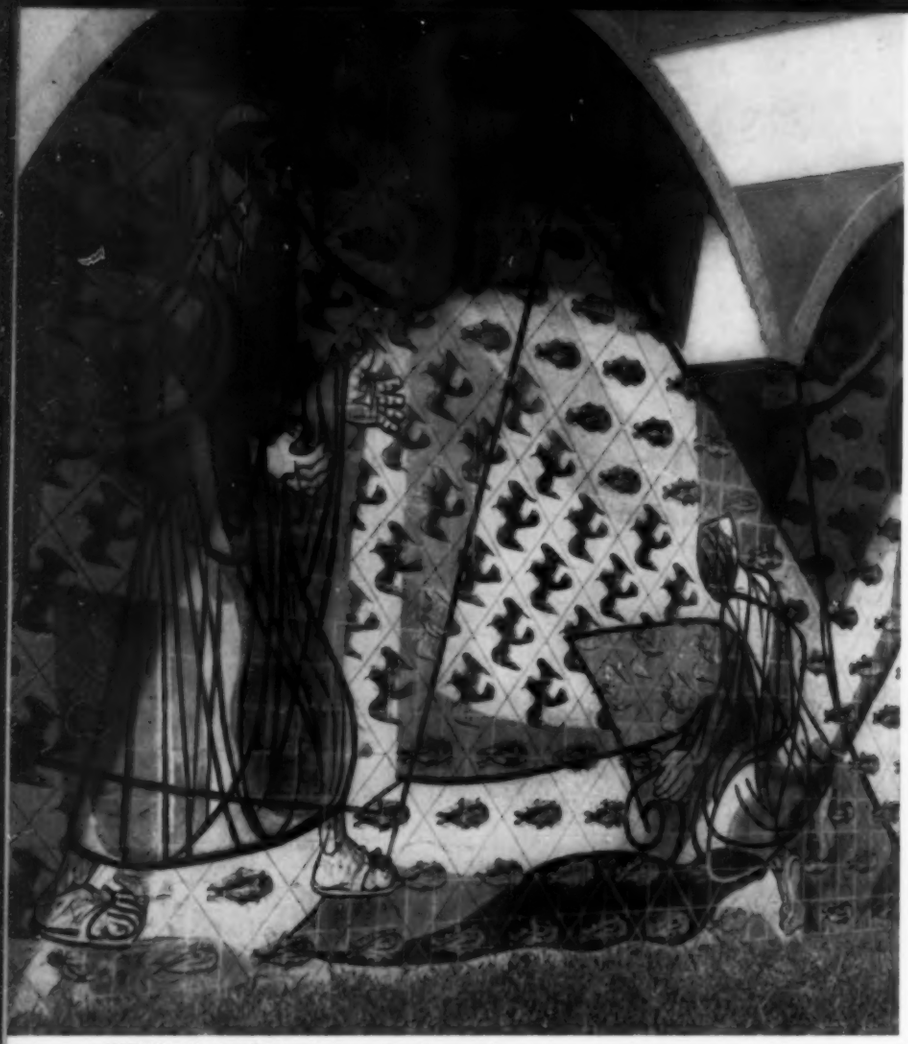
Remember that this is the chapel of St. Francis—a humble man whose life and devotion were directed toward the gentlest and simplest of living things, little children, fishes, birds, and so on. Hence the forms and surface treatment of the series of articulated, reinforced concrete dome sections are almost primitive in their direct treatment. The assembly of parabolic curves—a logical expression of concrete—practically suggests an outcropping of rock, a natural extension of the earth, albeit spaced and spanned in such a way as to provide for all the elements of the traditional church—nave and cruciform plan, altar and bell tower.

EDGES OF THE ENTRANCE CANOPY, supported by tubular steel members, are surfaced with pink granite.

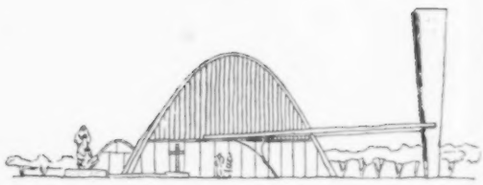


Photos by Marcel Gautherot

THE HUGE WINDOWED AREA above the entrance doors is protected by a brise de soleil made up of fixed panels of asbestos cement.



DETAIL of the Portinari ceramic-tile mural.

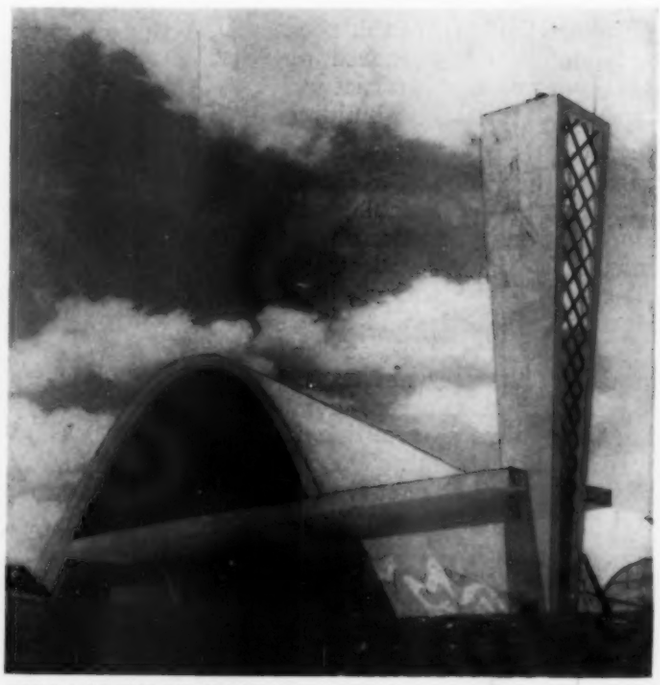


CHAPEL OF ST. FRANCIS, PAMPULHA, BRASIL

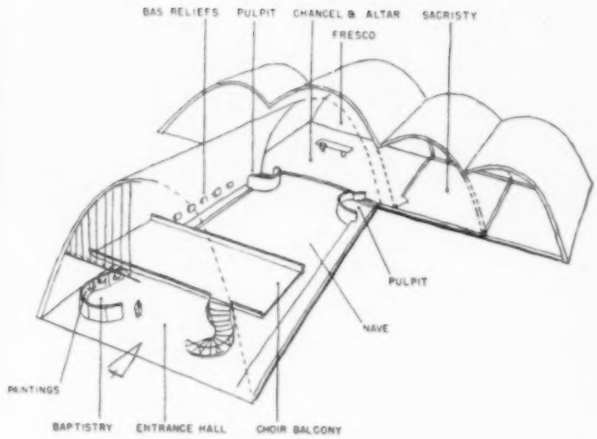
OSCAR NIEMEYER, Architect

The effect of naturalness and earth-closeness is further symbolized by the design of the great ceramic-tile mural by Portinari that makes up the rear face of the structure. Close at hand, the lively and colorful assortment of little wild animals surrounding the modest Saint have a sprightliness that one suspects children would enjoy—more, incidentally, than could be said for those church edifices usually referred to as "imposing." At not too great a distance, the huge mural becomes obscure and practically fades into the landscape, so skillfully is it devised in line and pattern, a technique not unrelated to that of the camouflage artist.

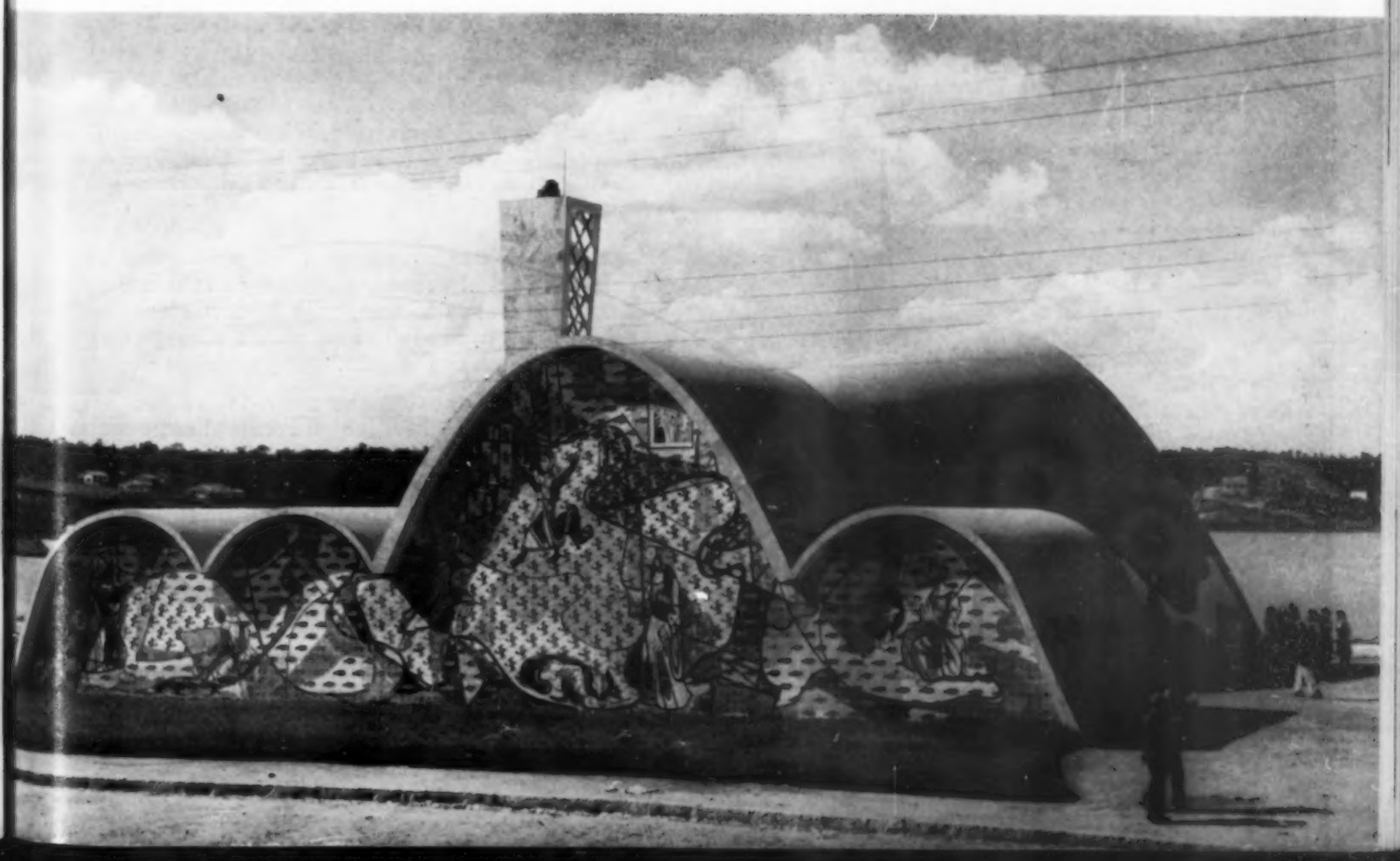
In the black and white photographs, unfortunately, the pale blue color of the mosaic tile that surfaces the vaulting toward the sky fails to show; though in actuality, as one observer tells us, it closely approximates sky color on a bright day and results in the same evanescent quality conceived in the earth-related wall mural.



DESIGN OF THE BELL TOWER—arms opening outward; limitless faith—surely as admissable a concept as the spire terminating in a point.



THE ALTAR FRESCO is the work of Portinari and his school.



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Photos by Gottscho-Schleisner

RETAIL STORE

JOHN WARD MEN'S SHOE STORE

NEW YORK CITY

PLANNED AS A COORDINATED UNIT with as little visual separation possible between shop front and interior, this retail store represents a happy blending of basic requirements of successful merchandising with uncluttered design.

Organization of the store interior is extremely simple—a single, central sales area, with reserve stock used as wall decoration on the left, and within alcoves on the right and in a room to the rear.

The sidewalk face of the store is treated as a frame around the brilliantly lighted recessed entrance and store proper. Surfaces are brick (on the left) and gray stone on the element at right, in which is set a small, square bronze-framed display window.

PHOTOGRAPHS AT LEFT: 1. The white oak chairs are upholstered in dark red-brown leather. Ceiling light panels contain concealed fluorescent lamps. 2. Two steps in foreground lead from entrance platform down to main sales level. Reserve stock is stored in library-type racks in alcoves at right. 3. Entrance area: hosiery bar (at left) and cantilevered showcase marking the division between this entrance area and the shoe-sales level. 4. Rear view of the cantilevered showcase, with shoe mirror at bottom.

(Details on following page)

Gottscho-Schleisner

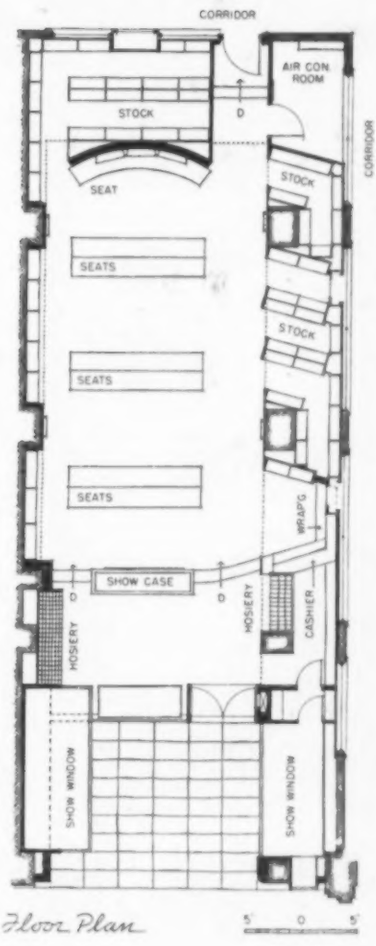
ENTRANCE AND SHOW WINDOWS

JOHN WARD SHOE STORE, NEW YORK, N. Y.

JULIAN VON DER LANCKEN, Architect

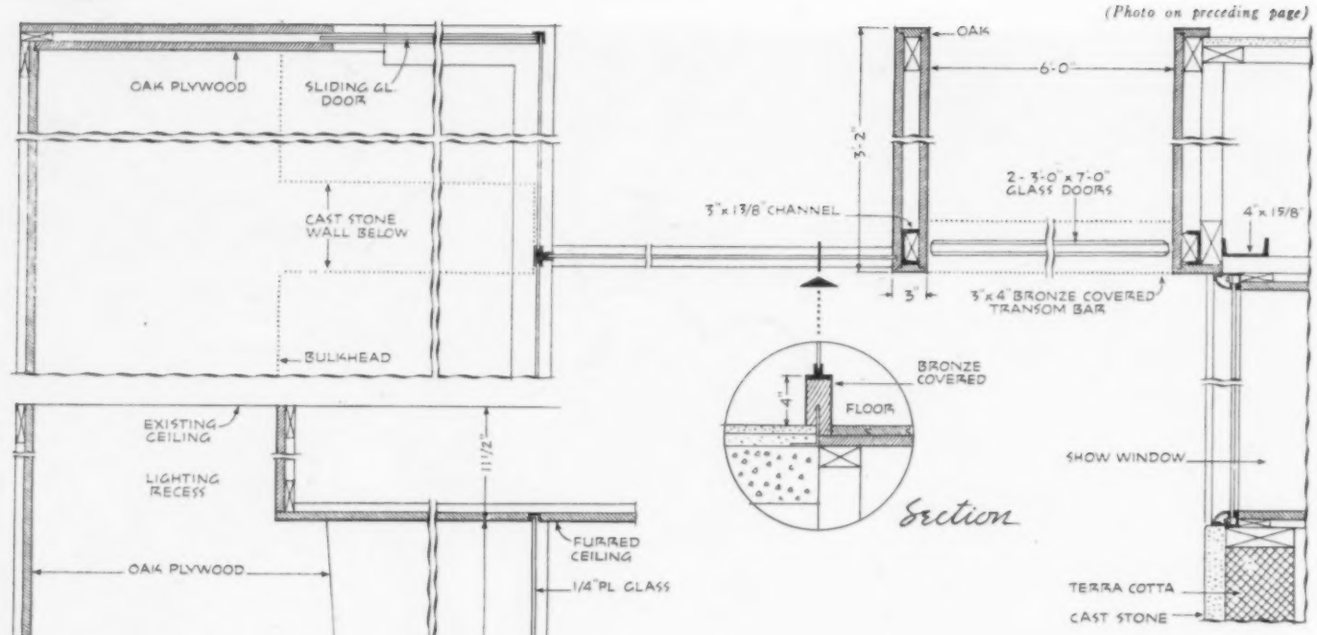
RAYMOND LOEWY ASSOCIATES

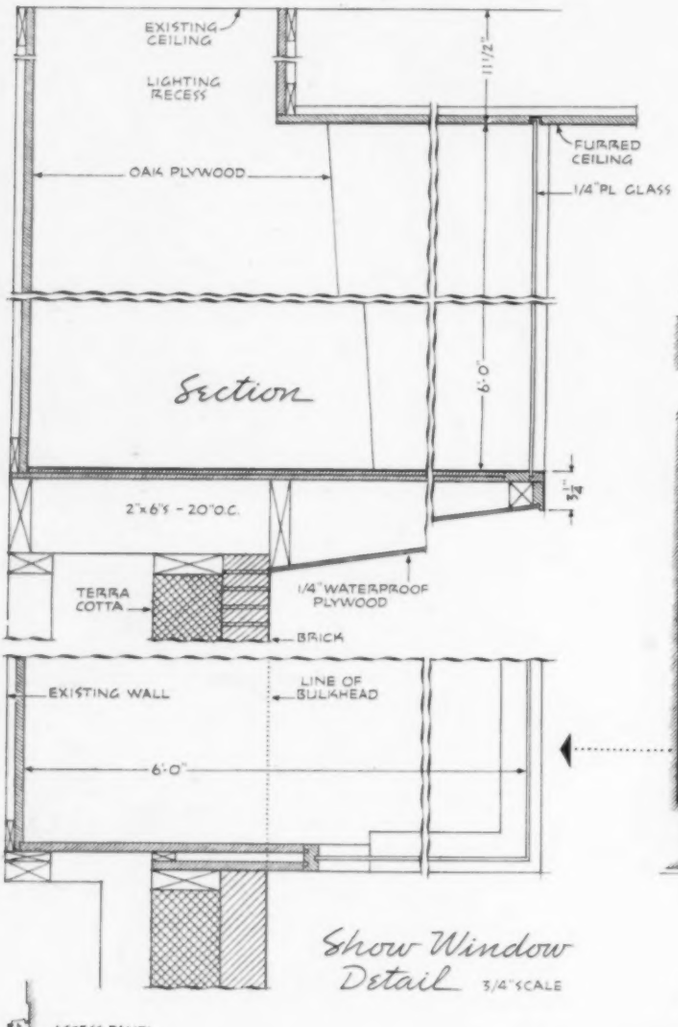
So ingeniously is the relation of interior to exterior of this store worked out that the three small white oak display cases on the brick-red rear wall are almost as important to the passer-by on the sidewalk as the exterior showcases. This is the aim of most store designers. Here it is accomplished by continuing from the arcade through the all-glass wall as many elements as possible: the gray ceiling with its square, recessed fluorescent fixtures; the show-window head height; tones and colors matched and repeated inside and out (from gray stone to gray-painted wood, with touches of brick color; carpet is gray-green). In such a scheme design of every interior detail becomes doubly significant. Taking advantage of a small difference in floor levels, the designers have used steps as well as fixtures to delimit the hosiery department and add spaciousness to the shoe sales area. The furniture and show cases (detailed on following pages) are upholstered in red-brown leather.

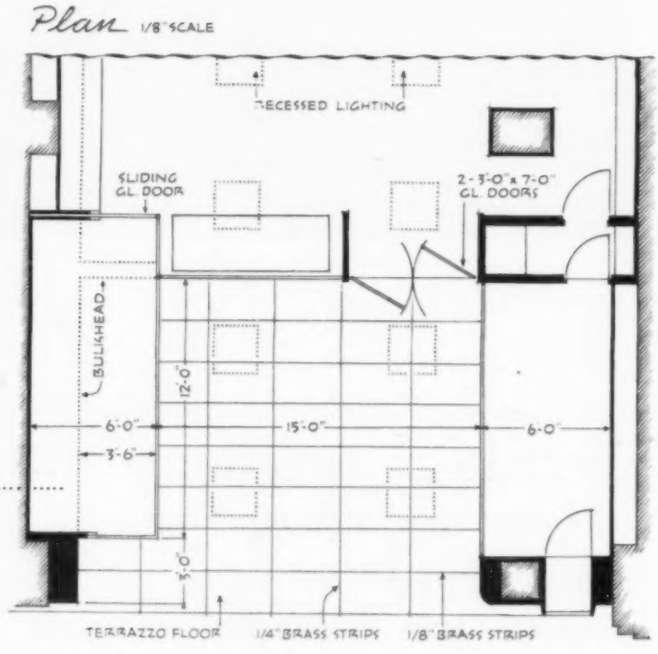


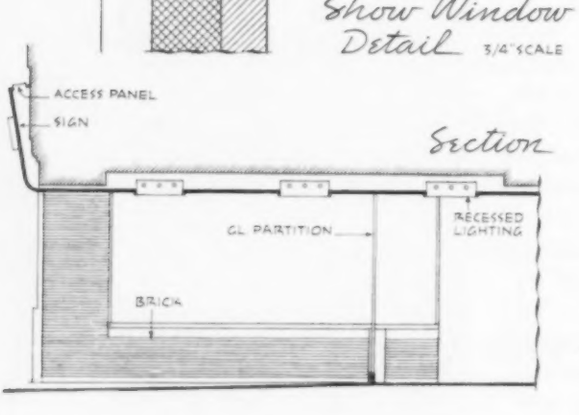
Floor Plan 5 0 5'

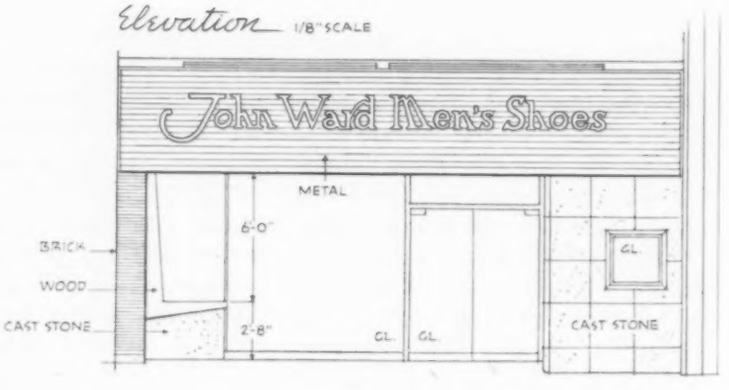
(Photo on preceding page)











ENTRANCE AND SHOW WINDOWS

JOHN WARD SHOE STORE, NEW YORK, N. Y.

JULIAN VON DER LANCKEN, Architect

RAYMOND LOEWY ASSOCIATES

Cottrell-Schlosser

(Details on following page)

Gottscho-Schleisner

SEATS AND SHOW CASES

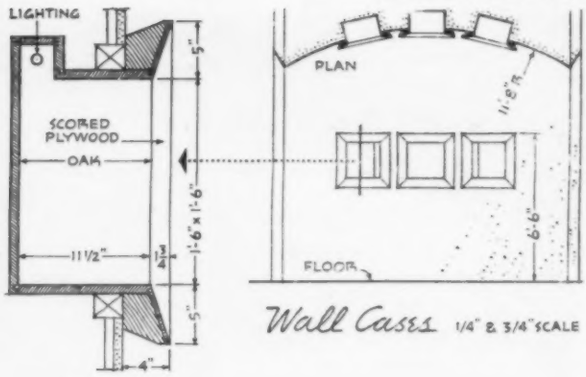
JOHN WARD SHOE STORE, NEW YORK, N. Y.

JULIAN VON DER LANCKEN, Architect
RAYMOND LOEWY ASSOCIATES

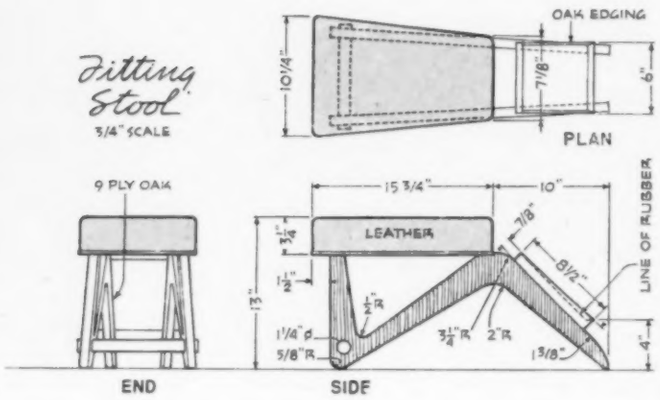
SELECTED DETAILS

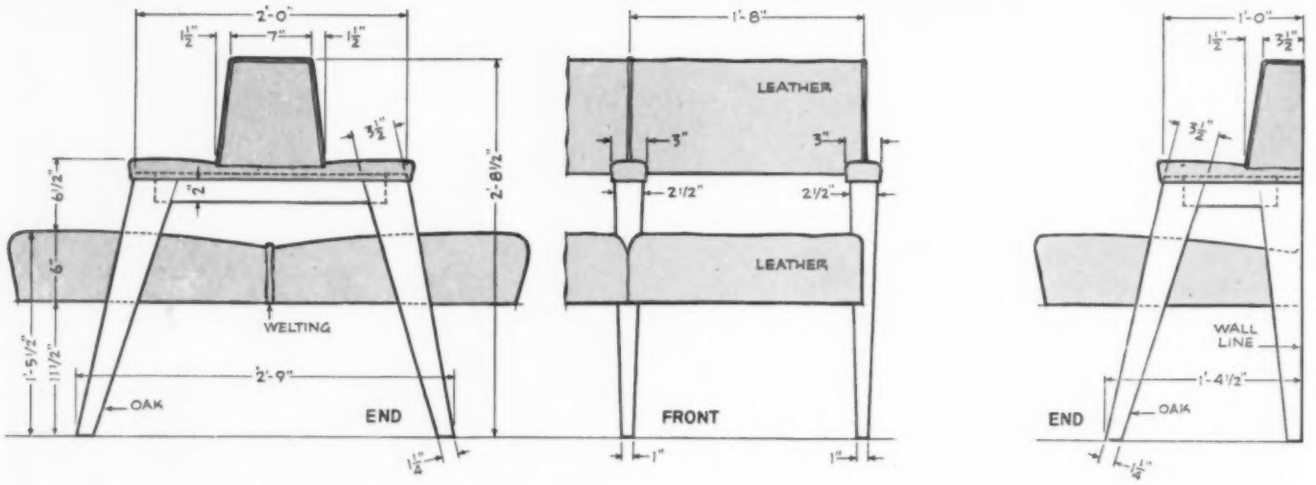
(Photo on preceding page)

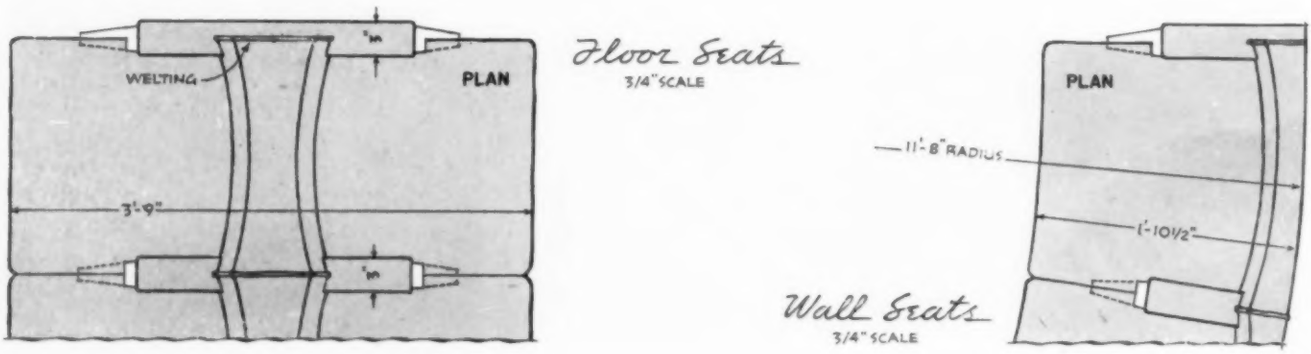
Gottscho-Schleisner



Wall Cases 1/4" & 3/4" SCALE







SEATS AND SHOW CASES

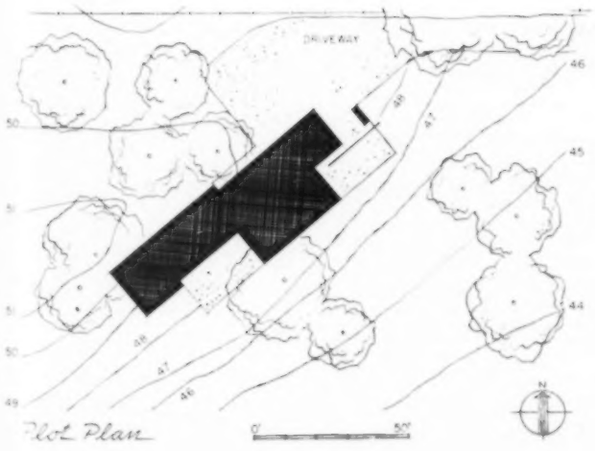
JOHN WARD SHOE STORE, NEW YORK, N. Y.

JULIAN VON DER LANCKEN, Architect
RAYMOND LOEWY ASSOCIATES

Photos by Hedrich-Blessing Studio

HOUSE NEAR BARRINGTON, ILLINOIS

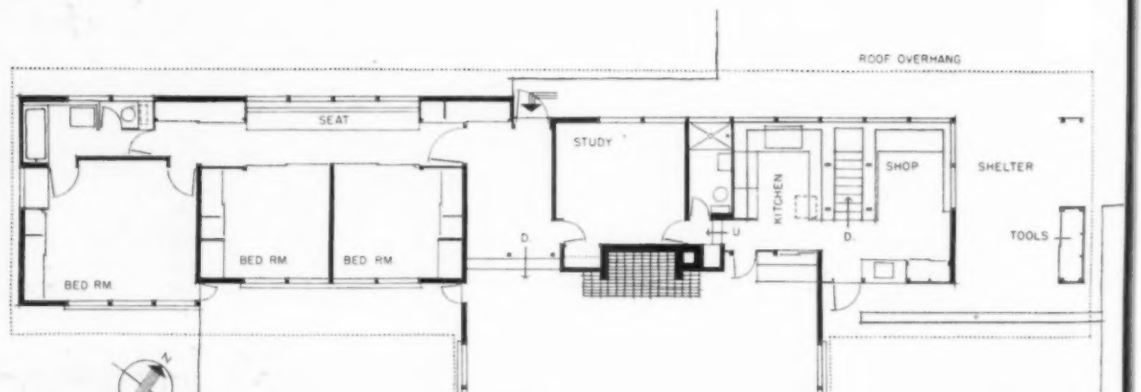
SCHWEIKHER AND ELTING, Architects



The family consists of the parents and two children nearing high school age. The head of the house works in Chicago, 45 miles distant, but wished to live in the country, grow vegetables, keep a cow, chickens, and a horse. This is, then, a contemporary version of the farmhouse.

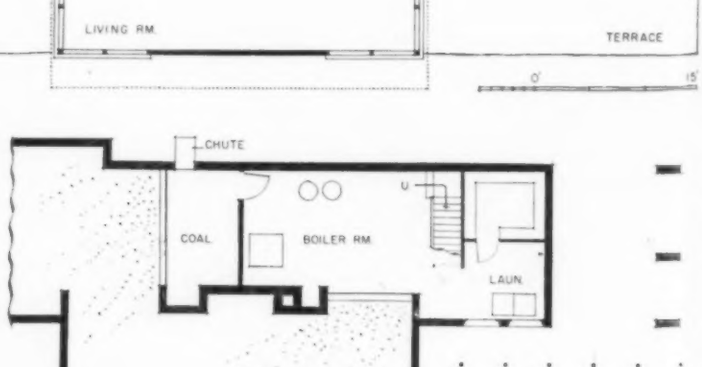
The site was chosen for its reasonable convenience to the school and shopping facilities of the town and to the railroad to Chicago. The Northwest Highway to the city parallels the property. The house, placed on the highest point of land, farthest from the highway, is planned so that its long axis is parallel to the northwest prevailing winds. The design scheme is developed so that the big southern window areas receive maximum low-angle winter sunlight and minimum afternoon summer sun.

THE BEDROOM WING and southern corner of the living room; plywood ventilator panels, redwood siding, cedar shingles on roof and sloped gable ends.



PLANS

The entrance is on the north; the study is schemed so that it also makes a private guest room. Workshop next to the kitchen is for minor carpentry and home-maintenance activities. Central placement of the kitchen makes it readily accessible from the workshop, boiler room, and laundry downstairs, and to the car shelter and southeast garden. The big living room is also used for recreation, dining, musical sessions (everybody plays some instrument). All doors either pivot on wood dowels let into the floors and ceiling or are sliding, providing great use flexibility and a greater sense of space.



A COVERED PASSAGE joins the car shelter with the front door; windows at right light the bedroom hallway.

THE LIVING-ROOM FIREPLACE. The room has oak flooring and fir plywood on walls and ceiling.

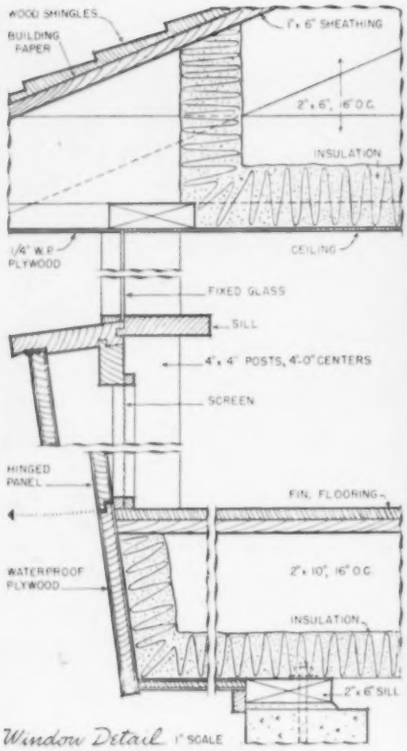
THE ALL-WOOD KITCHEN, with ventilator windows at ceiling height.

HOUSE AT BARRINGTON, ILLINOIS

SCHWEIKHER AND ELTING, Architects

The simplified structural system consists of concrete footings, fir studs, joists, and posts, with the framing posts spaced 4 feet on centers. The 4-foot module lends itself at once to application of the standard-size ¼-inch fir plywood that is used throughout for interior finishes. Plywood is also used for all sliding doors; swinging doors were made up on the job out of fir planking. Exterior siding is redwood; the roofing is cedar shingles. Trim has been wholly eliminated, and the structural members are exposed wherever it is logical to do so. Screened ventilators (see details, next page) occur beneath all fixed window areas.

The house is heated by coal-fired, direct, hot-water radiation, with column radiators placed at ventilators to offset winter infiltration of air at these points. For lighting, flush ceiling fixtures are used where general illumination is required, floor and table lamps taking care of special-area lighting.



THE VENTILATOR PANELS under the fixed windows are operated by lever devices inside the house.

HOUSE AT BARRINGTON, ILLINOIS

SCHWEIKHER AND ELTING, Architects

The detail of the fixed window combined with the ventilator shows how completely this house is a blend of structural and control elements. Photographs at right illustrate the flexibility obtained by use of sliding doors in the children's bedrooms.

BEDROOM WALLS slide back to open up space for other uses. . . . . Closed, the walls give the rooms complete privacy.

CORNER OF OWNER'S BEDROOM; sliding closet doors, pivoted door to bathroom.

Photos by P. A. Dearborn

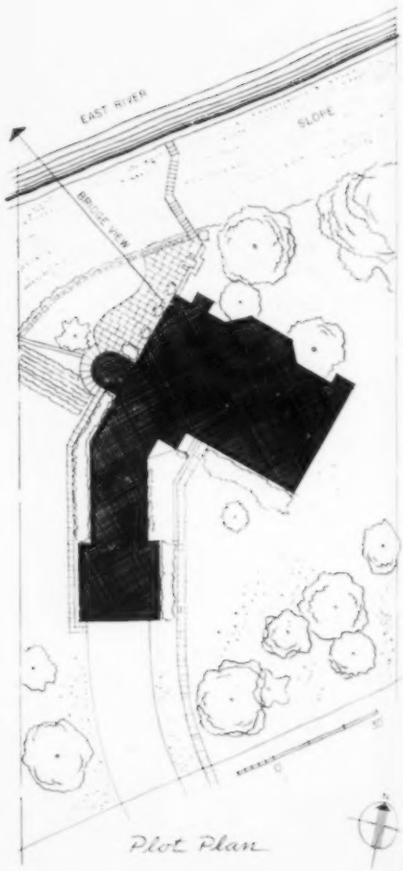
HOUSE AT WHITESTONE, QUEENS, NEW YORK CITY

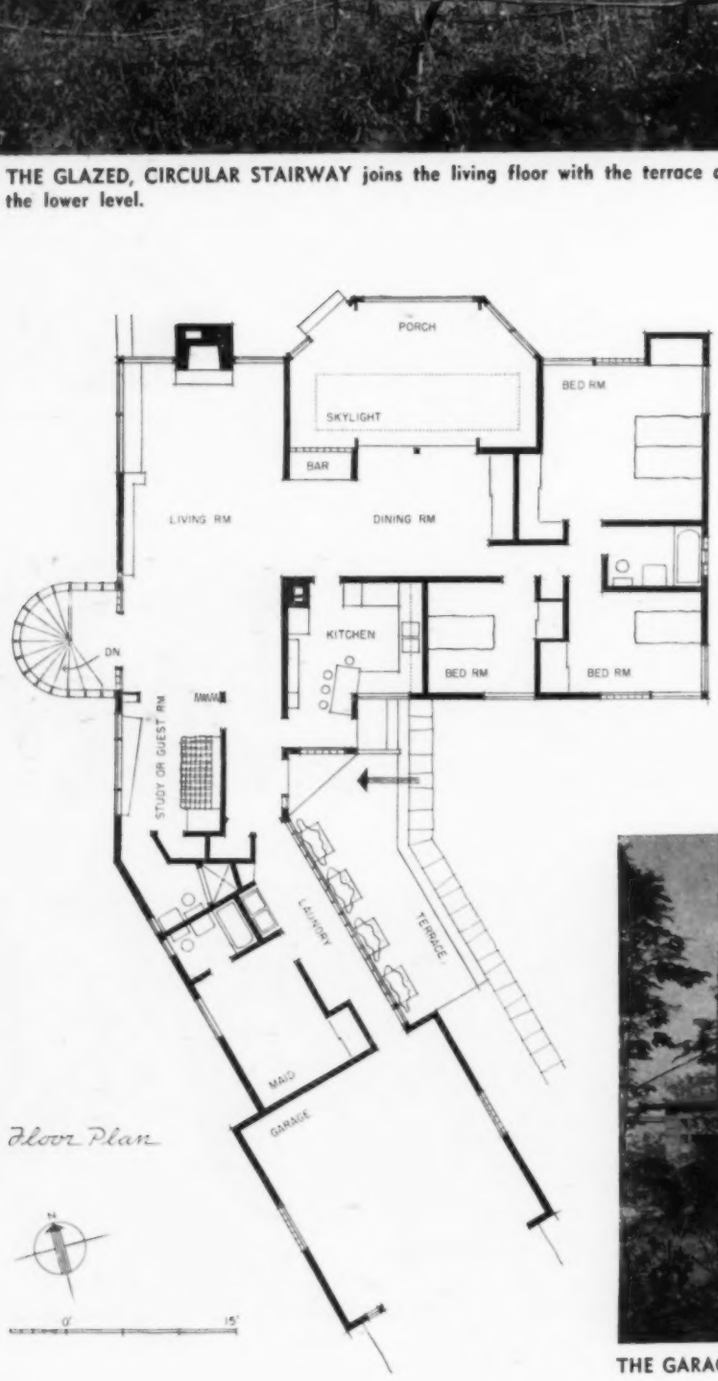
GANNETT HERWIG, Architect

WE ASKED THE ARCHITECT to say a few words about the design problem. "It is hard to think of this house as a problem," he replied. "It was pure pleasure from the start. The site would be wonderful anywhere, but to have this right in New York City is probably unique—a level, thickly wooded lot 100 by 400 feet in area and 40 feet above its own waterfront on the East River, with the beautiful Whitestone Bridge in full view only a quarter of a mile away."

HOUSE AT WHITESTONE, QUE

THE GLAZED, CIRCULAR STAIRWAY joins the living floor with the terrace and playroom at the lower level.





THE GARAGE is coordinated in design and plan with the main house.

QUEENS, NEW YORK CITY

GANNETT HERWIG, Architect

The house is bent in plan to conform to the contour, to preserve trees, and to bring the garage into convenient proximity to the access road. It is the home of a family whose chief delight is in people and entertaining. Hence, the generous, flexible-use study-living-dining-porch area facing the view. The bedroom wing occupies the eastern wing; the long, well lighted laundry also serves as undercover access from the garage.

It is interesting to know that the owners purchased the Redwood House in the "Town of Tomorrow" at the New York World's Fair (Landefeld and Hatch, Architects). While this house is in no sense a restoration, many elements, such as living room paneling, roof-frame members, steel sash, and glass block were re-used.

THE LOWER TERRACE AND PLAYROOM were gifts of the site, both enjoying the best view—along with the upstairs living room.

THE SOUTHEASTERN ENTRANCE CORNER preserves the remarkable view for a delightful surprise on entering.

THE DINING-PORCH BAY, clear glazed on three sides and with a corrugated glass panel in the roof, provides a special view vantage point.

Within, THE DINING ROOM may be closed off or joined with well lighted porch.

THE INFORMAL LIVING AREA is finished with redwood plywood, re-used to the last inch from the World's Fair Redwood House.

HOUSE AT WHITESTONE, QUEENS, NEW YORK CITY

GANNETT HERWIG, Architect

An unusual provision in the frame structure is a double 2″ x 10″ plate, spliced for continuity, around the entire perimeter, allowing flexibility of fenestration. House lighting combines recessed incandescent fixtures with indirect fluorescent units, plus table lamps. The heating system is oil-fired, direct forced warm air, from a basement unit.

MECHANIZATION OF THE HEARTH

1

2

EVOLUTION OF THE MODERN KITCHEN

By SIGFRIED GIEDION

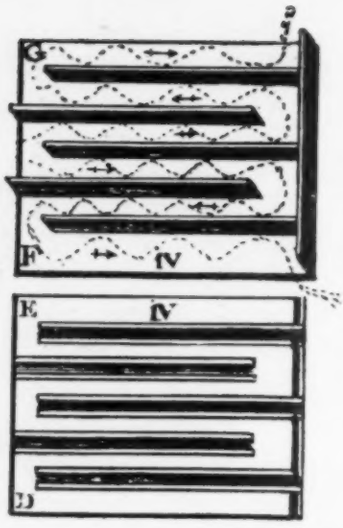
The following is a portion of Dr. Giedion's forthcoming book on the changes which the machine age has wrought in human environment, to be published by Oxford University Press in 1947. Dr. Giedion, architectural historian and member of the International Congress for Modern Architecture (C.I.A.M.), has completed several years' research into the complex devices and systems which the average person today takes for granted. PROGRESSIVE ARCHITECTURE's editors have selected from the book's many subjects Dr. Giedion's history of the kitchen range, which has profoundly affected family life not only of itself but also in its influence on kitchen planning and on refrigerators, cupboards, sinks, and related equipment.

Fig. 1: Cast-iron plate of a Pennsylvania Dutch stove, 1748, built by German and Swiss settlers. This was the origin of the cast-iron stove, basic heat source in the U.S.A. in the 19th century. Inscription reads: W. B. (William Bransen); K. T. F. (Koven Tree —i.e., Coventry—Furnace); and a bit of scripture: Gotes Brynlein hat Waser die Fyle (God's Well had Water in Plenty). *Fig. 2:* Gas or electric range incorporated in the Earle Unit Kitchen, announced in 1946 by the Reynolds Metals Company.

THE CAST-IRON RANGE: Concentration of the Heat Source

The history of the kitchen as we know it today is largely bound up with the growing concentration of its heat sources. The open flame of the hearth, coal within the cast-iron range, gas, and finally electricity, have followed one another as the heating agents. Their eras were of unequal length. For ages the open flame reigned supreme. During the half century between 1830 and 1880 the cast-iron range became prevalent. Between 1880 and 1930 the gas range won acceptance. Then, in ever rising tempo, began the era of the electric range. We are speaking here of things in flux, not of rigid dates. The different forms compete side by side, and before a heating agent triumphs it must usually pass through a prolonged incubation period.

Until late in the seventeenth century the open fire, the flame in the hearth, was often the sole heating agent in the cold season. The chimney of colonial times, whose stone blocks formed the heavy backbone of the house, is some measure of the tradition's vigor. In the large Gothic households, at the Burgundian court, or in the lordly castles, several fireplaces might be united in a kitchen building, as at Dijon or the royal palace of Cintra in Portugal. Their flues, meeting in a conical vault, formed the dominant of the architectural complex.



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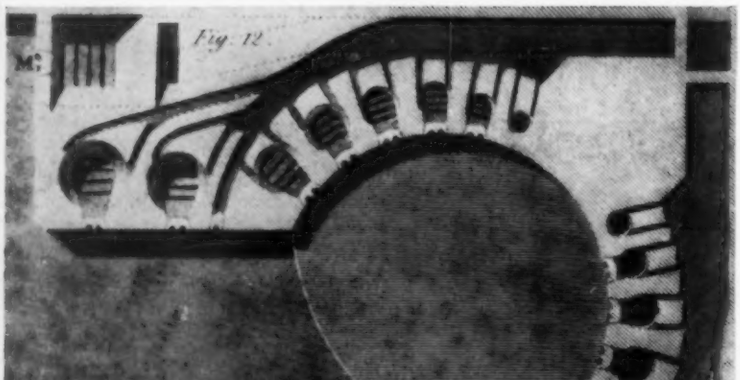
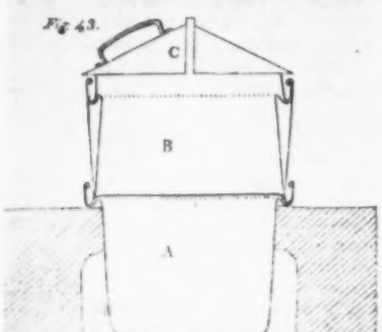


Plan of the New Kitchen of the Military Hospital at Munich

4

Of Cooking in Steam.

The following figure, which represents a vertical section of the apparatus, will show this contrivance in a clear and distinct manner:



A. is the boiler, which is seen set in brick-work.
B. is the steam-dish; and
C. is the cover of the boiler, which is here made to serve as a cover for the steam-dish.

The sides of the steam-dish (which is made of tin) are double, for the purpose of confining the heat more effectually.

5

Fig. 3: Franklin stove, ca. 1740. Concentration of the heat source (leading to the improved cast-iron range) begins with raising the stove's efficiency by passing combustion gases through flues. Franklin points out the precedent of French experiments: "Air rarefied by heat is specifically lighter than it was . . . and will rise . . ." *Fig. 4:* Count Rumford, oval range for military hospital, Munich, late 18th century. Rumford's semicircular or elliptical arrangement made it possible for the cook to watch all his pots from one position in the center. *Fig. 5:* Count Rumford, sunken saucepan for cooking by steam, forerunner of the modern steam table and of the cooking well available in some stoves today.

Only in the fifteenth century, with the awakening of a burgher consciousness, did the kitchen become a separate room of the house. But even into the seventeenth century it often served as the burgher dining room, 'often as the bedroom too,' and occasionally as a social chamber.[1] It was a neatly kept place and its rows of coppers became the display pieces that so often glow in the Dutch little-masters of the seventeenth century. A drawing ascribed to Jerome Bosch bears witness to the feasting and merrymaking enjoyed in the fifteenth century burgher house around the tall kitchen fireplace.

In the seventeenth century the kitchen ceased to be one of the main dwelling rooms. It became solely 'a service utility."[2] In the nineteenth century, with its speculative building and ceaselessly growing city populations, the kitchen lost its charm.

THE CAST-IRON RANGE

The fireplace prevails through the centuries. The cast-iron range, heated by wood or coal, dominates in the nineteenth; the steam boiler and the iron range are as characteristic of the nineteenth century as hydraulic power and electricity are of ours. No country has produced iron stoves and ranges in such profuse variety as America. English observers note this, from Charles Dickens' comment on 'red-hot monsters' in the forties to Oscar Wilde's complaint some four decades later against heat-radiating decorations often seen in the center of the room. The cast-iron stove and range were identified with America much as the automobile was later. From America the most diverse models reached the Continent and England, but the tiled range with its even store of heat was still favored in the European kitchen, despite the fact that specialists were required to build it tile by tile. Catherine Beecher, if not on the esthetic grounds of the English observers, voiced practical objections to the cast-iron range which in the sixties was already supreme. "We cannot but regret that our old steady brick ovens have been almost completely superseded by those ranges which are infinite in their capacities and forbid all general rules."[3]

The range is based on the concentrating of the heat source within a reduced space, and all the skills of a scientific century were needed to channel the heat effectively and overcome the range's drawbacks. Thermal efficiency lay beyond the craftsman's scope; it was a matter for the physicist. The steam boiler and the cast-iron range have a common prerequisite: the efficient utilization of heat by the correct channeling of combustion gases. Understandably then, the men who guided the development of the range were rarely stove makers by training.

Benjamin Franklin built no kitchen range, but had designed before mid-eighteenth century a stove to be placed in the fireplace, for utilization of the unexhausted combustion gases. In France especially, as Franklin himself admits,[4] attempts had already been made to improve the thermal efficiency of fireplaces. Franklin's 'Pennsylvania Fireplace' of 1742,[5] although it met with no favor in its own day, has remained the most famous of such efforts. Franklin also found suggestions in the 'Dutch Stove' which was widespread in Pennsylvania (he also calls it 'Holland Stove'). It was made of cast-iron plates. Using the same material, he formed an air box with cast-iron walls in which 'the smoke ascends and descends and heats the plates.' Py this and other improvements he more fully used the escaping heat, and allowed it to radiate more equally through the room.[6]

Benjamin Thomson, Count Rumford (1753-1814), raised in colonial America, was a British officer, Bavarian statesman and general-in-chief, and, which is to the point here, one of the great late-eighteenth-century physicists. Rumford designed an indirectly heated oven for the kitchen of a workhouse in Munich, where the heat and smoke passed through a ramification of flues around the sunk-in saucepans. Discoverer of latent heat, inventor of the soups which still bear his name, author of an essay, *Of the Excellent Qualities of Coffee and the Art of Making it in the Highest Perfection*,[7] (giving recipes, several designs of percolators still used today, and voicing the idea that coffee should become the beverage of the masses) Rumford, with his scientific experience, was indeed the man to perfect the range.

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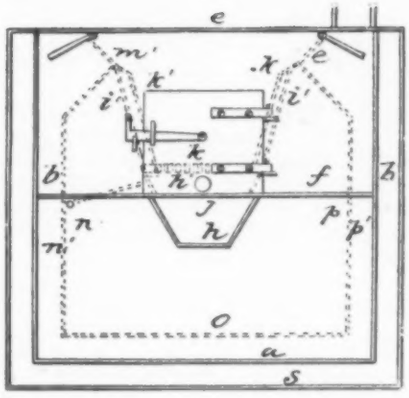

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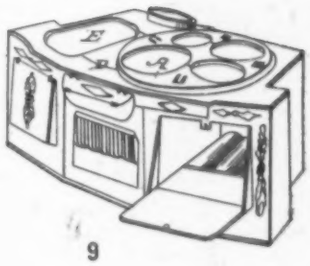

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The social experiment of cooking for a thousand people daily in his Munich workhouse offered an excellent opportunity. Rumford also built large ranges for Bavarian aristocrats, for military academies, and for hospitals in Italy. All were shaped along similar lines: the cook did not walk around his pots but watched them from the center. For the range was hollowed in the same semicircular or oval shape as the small *maisons de plaisance* in the Park of Nymphenburg, where Rumford was a frequent guest. In form, these ranges were infused with the eighteenth century spirit, and bore no resemblance to the towering monsters created by the nineteenth century. They are described and precisely shown in one of Rumford's most perspicacious essays, the tenth. These 300 pages, *On the Construction of Kitchen Fireplaces and Kitchen Utensils, Together with Remarks and Observations Relating to the Various Processes of Cooking and Proposals for Improving that most Useful Art*,[8] are a store of experience and suggestions based on exhaustive theory and a gift for technical solutions. It is almost the outline of what was to follow in the development of cooking equipment.

How was the kitchen outfitted in Rumford's time? There were then no kitchen appliances in the present-day sense. All were yet to be invented. "The kitchen fireplace of a family in easy circumstances in this country," he wrote on his return to England, "consists almost uniformly of a long grate for burning coal placed in a wide and open chimney."[9] In its stead he proposed the range he had evolved in Munich, but went a step further. The heat source, he repeatedly stressed, should be contained within the smallest possible compass. He showed the "usefulness of small iron ovens and the best methods of constructing them,"[10] and, before 1880, had designed "small ovens for poor families."[11] Most interesting perhaps, in this connection, is a 'very simple and useful portable kitchen furnace' with Rumford's sunken stewpan, around which the combustion gases may pass. The conically tapered fire chamber is suspended like a bird's nest. This confining of the heat, as well as its suspension allowing ready access of air, laid down the pattern for the rational range of a later time.

He painstakingly argued to the public the advantages of the roasting oven in even radiation and greater juiciness of the meat, and proposed roasting ovens made of "a hollow cylinder of sheet iron, closed at one end and set in brick work, so that the flame of a small fire may play directly beneath."[12] He paid special attention to the design of the cooking vessels to be placed on a compact heat source. And here we can see the iron adapter rings later used to make the range fit various sizes of pans. The utilization of steam for cooking, and the economizing of heat by stacked pans, were outlined in strikingly adequate constructions. The sides of the steam dish were double 'for the purpose of confining the heat more effectually.' There was even an elegant proposal for a self-contained kitchenette shut off by doors, which he recessed, cupboard-like, into the wall. Rumford called it a 'concealed kitchen.'[13] Rumford often moved along paths that were not later traveled. But, he pointed out, his suggestions, although based on wide practice, were experimental. He was delving into an unknown sphere, and as a creative scientist he often anticipated things later to be laboriously wrested from the trial and error of everyday experience.

Fig. 6: "Mock-up" of a proposed electric range with sunken pans, 1943, Libbey-Owens-Ford Glass Co. Built-in cooking vessels, waffle iron, food mixer. When not in use, counter panels were to be lowered over working units to convert the kitchen into playroom or study. Is this a sign that the kitchen may again become a dining and social chamber? Might it, at least, contain an easy chair for the housewife, play space for children? *Fig. 7:* Cast-iron cooking stove, American, 1858. From the Pennsylvania stove and improvements by Franklin, Rumford, and Stewart, the cast-iron range was developed. *Fig. 8:* Philo Penfield Stewart, summer and winter cooking stove, U. S. patent, 1838. Firebox "formed narrower below than at the top" as in Rumford's stoves. Stewart claims manifold technical improvements: removable jackets to control room temperature; even radiation; heat control; partial extinction and re-ignition; fuel economy; adaptability to various fuels; easy ash removal; hot water supply. *Fig. 9:* Range with rotary top, U. S. patent, 1845. Any of several utensils could be held over the fire by rotating the top plate, reducing inconvenience and danger of shifting pots. By changing dampers heat could be directed to stationary boiler, to rotating plate, or both.

10

The successive American improvements of the cast-iron range were largely elaborations of the Pennsylvania Dutch oven. Over three decades passed before the stove of cast-iron plates entered upon its expansion. It was given a special grate such as had long been useful in fireplaces. An ash chest was added, and on one side a roasting oven heated above and below by the combustion gases.[14]

The third name directly linked with the shaping of the range is that of the man who comes closest to the description of a stovemaker; he later engaged in stove manufacture. He was Philo Penfield Stewart (1798-1868), who began as a missionary and teacher, riding two thousand miles on horseback to preach before an Indian tribe. He was instrumental in the founding of Oberlin college and possessed the inventive gift, as widespread in the America of his day as the gift of painting in the Renaissance. Philo Stewart hoped to combine study in his college 'with such economy that the students may defray all their expenses.' The school opened in 1833, and the next year Stewart took out a patent for a cast-iron stove which he named Oberlin, after his institution. When he registered a last patent a few years before his death the mechanism had been thoroughly thought out and proved in use. A glance at the sketch reveals the features he had intended from the first: utmost concentration of the heat source (which burned the fuel then usual, wood); free suspension of the fire chamber like a bird's nest, as in Rumford's range; the surrounding of this chamber by air; perforation of the chamber walls which, as in Rumford's model, taper towards the bottom.[15] We may take it that a man of Stewart's type must have been acquainted with Rumford's writings, which enjoyed an extraordinarily wide public. He nevertheless went his own way, for he had to apply his theoretical knowledge of heat to the practical course of development of the stove in America since 1800.

When he patented his first stove in 1834, Stewart, thinking that royalties might yield some income, made over the patent rights to his college—a clear indication that this was the pre-business period. But Stewart soon left Oberlin and moved to Troy, where in thirty years he manufactured some 90,000 stoves.

Philo Stewart's Oberlin Stove, it is generally recognized, formed the starting point for the technicalized range. Then begins the time of specialists and technical improvements. By around 1840 the cast-iron cooking stove was a vigorously plastic type, having a base and superstructure. It drew the same interest in its time as efficiency kitchen units a century later. As in other fields, the most active period of invention was from the middle fifties down to the seventies. We shall not need to follow the coal range in its later career.

THE TIME OF THE GAS RANGE: 1880-1930

The advent of coal gas made possible a further concentration of the heat source: although the open flame is still used, it is now confined within the narrow bounds of a burner ring. Just as England led the seventeenth century in the utilization of coal for industrial or household purposes, so it led in the manufacture and use of coal gas during the nineteenth.

Compared with its rapid attainment of popularity for illumination purposes, gas established itself surprisingly slowly and belatedly as a heating agent.[16] True, several starts were made in the first decades, but it was only toward mid-nineteenth century that interest began to awaken among the English public. Demonstration kitchens were put on view, and a wide variety of gas-cooked dishes proved how well this tenuous fuel could serve the household. Well in the direction of the future standard was the gas range with a plain cast-iron top and spiral burners, constructed by a Glasgow restaurant owner and shown at the Great Exhibition of 1851.[17] But even then the general public failed to patronize the range, which was mainly purchased for hotel kitchens. "The history of the use of gas for heating and for cooking" during the three decades from 1850 to 1880 "was one of exceedingly slow development."[17] In 1879 an English firm exhibited "over three hundred appliances in which gas was to be used for other purposes than lighting"[17]—for ranges, ovens, flatirons, and other laundry appliances. This is supposed to have given considerable impetus to the new fuel.

Around 1880 the time slowly set in during which the public lost its distrust of the gas range. But one must not suppose that people at large were quickly or easily won away from wood and coal to the imponderable fuel. In 1889[18] a Chicago catalogue stressed: "For eight years we have been manufacturing the Jewel. We were among the first to appreciate that gas was to be the fuel of the future. Is the use of gas for cooking purposes an extraordinary luxury? No, it is an economical necessity. The popular prejudice is gradually giving way."[19]

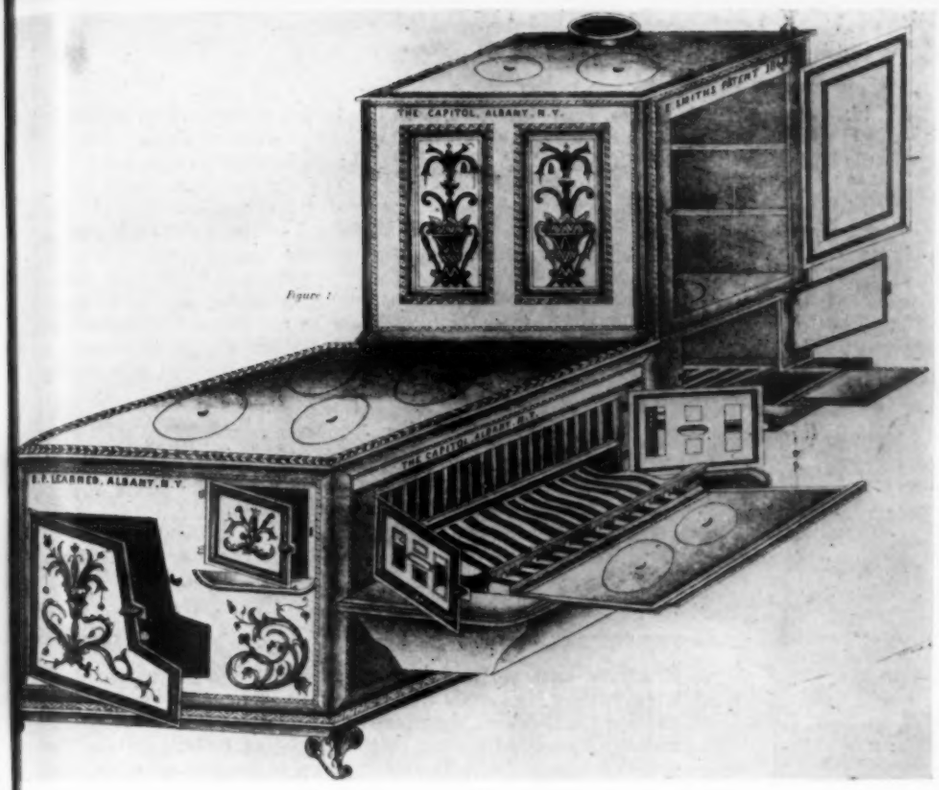
As late as 1910 'combined coal and gas cooking ranges' are listed,[20] and even around 1915 the catalogues appeal in verse with the ever returning refrain "Save the Wife her Time and Care: Cook with Gas."[21] Nevertheless in 1910 half the volume of gas used for illumination was already being consumed for burning purposes.

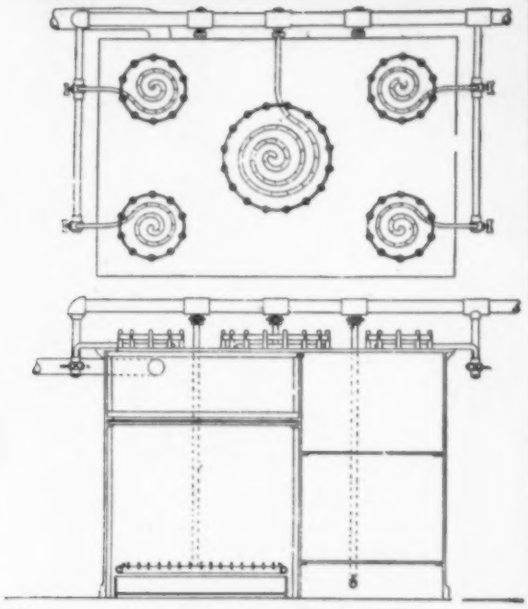
Deviously, the pure forms of the gas range emerge around 1930. At that time gas cooking already had to reckon with a new rival, the electric range. There seemed to be no breaking loose from its prototype, the coal range; in the larger models the baking oven and broiler were still being placed above the cooking top, a practice which in the smaller ones led to somewhat giraffish proportions.

All that at first glance distinguishes them from the coal range is the table-like frame on which they stand, whose curved and highly ornamented cast-iron legs seem to have emigrated from some Regency salon. These models had their day from the nineties into the second decade of our century. Their design, viewed in conjunction with their time, and considered together with their exuberant ornamentation of silvery metal, betrays the inner insecurity and helplessness of that prosperous era.

But these diversions are secondary. Of greater consequence was the fact that, bogged in the pattern of the coal range, the gas range was segregated within an insulating zone, which delayed its merging into the kitchen work process. Side by side with this, however, ran another form more in keeping with the nature of the gas cooker. Here the flat range top cut by circular burners prevailed as in the model seen at the Great Exhibition of 1851. The broiler and oven occupy the space beneath, while to either side perforated stacking surfaces extend the range top.

The white areas of porcelain enamel, which were later to cover the range and change radically the aspect of the kitchen, were already used in 1910, although confined at that period to the range top and splashback.[22]





12 *Graham's Gas Range, Glasgow, 1851.*

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Fig. 10: Gas range, American, 1941. The "table top" range, with white enamel work surfaces, developed during the early 1930's. Confined heat source permits compartments for towels, plates, cutlery, etc. **Fig. 11:** American cast-iron range, 1848. Combinability and movability are stressed; illustrations usually show all doors open. A forerunner was the fireplace with built-in boiler and cast-iron oven of the early 19th century; a later "improvement" was the imitation of brick or stone in cast-iron plates. **Fig. 12:** Gas range, Glasgow, 1851. Designed by a restaurant owner, this had many features of the "table top" range, but the gas range had to be tediously derived from the cast-iron stove when gas cooking became accepted toward 1900. **Fig. 13:** Gas range, American, 1889. "The popular prejudice is gradually giving way," reported its manufacturer. **Fig. 14:** "Table top" gas range, 1933. Thoroughly assimilated, the gas range has been brought into line with base cabinets and other units of the mechanized kitchen. The few later refinements include more complete insulation, slight changes in organization, methods of hinging doors, etc.

From the flat topped English type with its stacking surfaces, where oven and often a broiler occupy the base, the Americans after 1930 developed their 'table top range.' Now the black top has become a working surface of white enamel, cut only by the burner openings to the left. Under the name of 'compact table top range,'[23] although they have no true working or stacking surface, the earlier models appear around 1931. The catalogues advise that the new range 'makes smaller kitchens possible, makes kitchen planning easier.' The influence of household planning is taking effect.

That the gas industry should have supplied the leadership at this time is not strange. It had long practice in setting up demonstration kitchens equipped with household aids. Beginning in the early thirties trailer demonstration kitchens traveled the land; the gas industry was first in the commercial field thoroughly to investigate scientific management in the kitchen.

The automatization of the range so carefully perfected in America during the time of full mechanization began with the gas cooker. In 1915 appeared the oven regulator, a thermostat adapted to this purpose, the first notable invention since mid-century.[24] This begins the mechanical regulating of time and temperature, later to become an American specialty, particularly in the electric range.

The table top range fits the height of other working surfaces and, the makers stress,[25] is proportioned so as to merge with base cabinets continuous along the wall. Soon the abbreviated legs altogether disappear. The table top range, with its drawers for accessories, has found its standard form. It is

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Fig. 15: Imaginary electric kitchen, 1887. Saucepans, heated by battery current, rest on insulators; walls of the pan are conductors. Foods cooked are said to have "an electrical flavor." *Fig. 16:* Electric kitchen, Columbian Exhibition, Chicago, 1893. Distinct units for each purpose, a principle revived in the 1940's. *Fig. 17:* General Electric range, 1905. The electrical heat source is still treated with experimental caution. Movable jacks afford varying temperatures. *Fig. 18:* The electric range becomes popularized—mail-order catalog, 1930. *Fig. 19:* "Hotpoint," 1946, electric range, part of the "all-electric kitchen" designed for the veterans' housing market, is easily combined with counters and other equipment. *Fig. 20:* The range, gas- or electric-heated, disappears into a complex assembly comprising all mechanized equipment needed in a small house (Ingersoll "Mechanical Core," 1946). The assembly dictates location not only of kitchen but also laundry and bath. (Ed. Note: Range manufacturers have yet to discover that many housewives would prefer oven and broiler design which would not necessitate bending far over, or squatting Indian-fashion on the floor.)

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furniture among furniture. The concentration of the heat source has been carried to its logical conclusion.

THE ELECTRICAL HEAT SOURCE

Electrification shrinks the heat source to a mere spiral of wire, a thin resistance which the current causes to glow and radiate heat. From the first the main task was to bring this radiation in close contact with the object to be heated. The problem was technically solved in several ways, no change of principle being involved. Now heat is instantaneously produced without so much as the striking of a match.

The creation of heat without a visible source went counter to the age-old association of heat with flame. Yet the use of gas fuel has opened the public mind to new, unfamiliar methods. The gas range had taken eight decades to introduce; the electric range no more than half that span. Now, around 1930, household mechanization, previously a cause of hesitation and distrust, became the strongest of sales inducements. Obstacles there were. But they lay rather in the nature of things. The electrical network was sporadic, current too expensive, the apparatus too highly priced and too delicate for the household.

For a long time a tinge of the wondrous seemed to pervade all things electric. There was in truth something to marvel at when the seventy-year-old Michael Faraday toured the English lighthouses in 1862 and first beheld the practical application of his light, or 'magnetic spark' as he called it, which had arisen in his hands three decades earlier.

When, late in the eighties, one toyed with the idea of using electric current for culinary purposes, its portrayal was more suggestive of witchcraft than of a useful invention. One of the popular scientific booklets[26] then so numerous reports a Canadian invention 'answering to this fantastic desideratum,' cooking by electricity. The description is the more fantastic in that the inventor claims to have baked cakes with his apparatus, and these are supposed to have an indefinable 'electrical flavour.'

Yet electrical cooking caught on quickly enough. Practical experiments were first made in England around 1890. An electrical fair held at the Crystal Palace, London, in 1891,[27] is said to have brought the new cooking agent before the public.

The Chicago World's Fair of 1893 outdid in one respect the Eiffel Tower and Halle des Machines of its immediate Parisian forerunner: it provided a display of electrical illumination such as had never before been witnessed. A number of industrialists had spiritedly begun electrical experimentation in various directions. Included in the exhibition was a "Model Electric Kitchen" having a small electrified range, electric broiler, and electric kettles.

Just as demonstration kitchens had been set up to bolster confidence in the gas range of 1850, the same strategy was used four decades later to popularize electrical cooking. The Algonquin Club in Boston is recorded as having set up a demonstration restaurant for twenty persons, where a full dinner was cooked, (from the bread to fish, sirloin roast, and

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18

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coffee) the cost of fuel amounting to barely over a cent per person.[28] But this dinner seems to have proved no more persuasive than the electrically cooked banquet held in 1895 in honor of the Lord Mayor of London. There followed an incubation period (1890-1910). The electrified ranges which then made their appearance had the same giraffish aspect as the contemporary gas stoves. "Between 1909 and 1919," a contemporary handbook states, "electric range manufacturers had developed the most perfect cooking device in the world."[29]

Various producers of electricity were now delivering current for cooking at a low price, and the power network was spreading. The electric range was recognized as a large consumer of current, and modern sales organizations grew up in America to apply the necessary stimulus. They were later imitated in most electricity-producing countries.

Yet for 1919 this optimism was perhaps too rosy. Indeed, five years later, a long series of articles on electric kitchens for private houses tells us that disappointments were not unknown. "Some people who tried electric cooking gave it up again on account of the excessive repair bills and the inconvenience connected with the burning out of elements. This shows that there must be many defects still connected with electric cooking appliances and room for considerable improvement."[30]

About the development of electric types there is little more to be said than for gas ranges. They were patterned after the gas range of the type already mentioned, a console raised on legs with oven and broiler above the cooking top. Until after 1930, when the electric range's popularity began, the gas range held the lead, and was apparently first to attain the "table top" form, standard today. From then on, as the larger electrical firms take to selling entire kitchen units and undertake their own investigation of the work process, the electrical range comes to the fore. This is in the mid-thirties. Now it has a gleaming white enamel casing and the oven cannot be distinguished from the utensil drawers. It has merged with the kitchen. And even more clearly than where there is a visible flame, one can see how the kitchen of today developed from the serving pantry, the room with continuous working surfaces where, in large middle-class households, domestics used to add finishing touches.

1. Havard, *Dictionnaire de l'Ameublement et de la Decoration depuis le XIIIe siecle jusqu'a Nous*, Vol. I, col. 1132.
2. Ibid., col. 1133.
3. Catherine E. Beecher and Harriet Beecher Stowe, *The American Woman's Home*, New York 1869, p. 175.
4. Nicolas Gaucher.
5. In his biography of Franklin, Van Doren gives the date as 1740.
6. It is rewarding to read Franklin's own description and the six methods he lists for artificial heating in his time; and pleasant to observe how he mentions to the disadvantage of the Dutch Stove that "There is no sight of the fire which is in itself a pleasant thing." And of the 'German Stove' where the heat is piped in from another room he remarks, "People have not even so much sight of the fire as in the Holland Stove." Cf. Jared Sparks, *The Works of Benjamin Franklin*, London 1882, Vol. 5, pp. 38, 43, 44.
7. Sir Benjamin Thomson, Count Rumford, *The Complete Works*, Boston 1870-75, Vol. 4.
8. Ibid., Vol. 3. Cf. another essay in the same volume, "Of the Management of Fire and the Economy of Fuel."
9. Ibid., Vol. 3, p. 227.
10. Ibid.
11. Ibid., Vol. 3, p. 321.
12. Ibid., Vol. 3, p. 257.
13. Ibid., Vol. 3, pp. 460-67.
14. For particulars of this development, see William J. Keep, "Early American Cooking Stove," *Old Time New England*, October 1931, Vol. 22, which includes a list of the American patents down to 1836.
15. Philo Stewart's patents: 19 June, 1834; 12 September, 1838; 18 January, 1859, (No. 22681); 28 April, 1863 (No. 39022).
16. F. N. Morton, "The Evolution of the Gas Stove," *Public Service*, Chicago, July 1908, Vol. 15. According to Morton the first English patent on gas appliances for heating purposes was taken out at the beginning of the nineteenth century by F. A. Windsor; other patents and proposals, in 1825, 1830, and 1832 (illustrations of these in Morton).
17. Morton, op. cit.
18. Prior to this time (from around 1880 on) America, with its abundant petroleum had specialized in the gasoline stove which was later perfected and is still in use (kerosene stove) throughout the country.
19. Catalogue of George M. Clark & Co., 179 N. Michigan Ave., Chicago, Ill., *Jewel Gas Stove Catalogue;* copy in the Edison Institute, Dearborn, Mich.
20. Catalogue of the Fuller and Warren Company, Troy, N. Y.; copy in the New York Public Library.
21. Catalogue of the Standard Lighting Company, Division of the American Stove Company, Cleveland, Ohio, *New Process Gas Ranges;* copy in the New York Public Library.
22. Catalogue of the Reliable Stove Company, Division of the American Stove Company, Cleveland, Ohio, *Reliable Gas Stoves and Ranges*, 1914; copy in the New York Public Library. Cf p. 10: "Some years ago we introduced the beautiful . . . porcelain enameled idea which has proven a decided success . . . We are now operating one of the most complete enameling plants."
23. Catalogue of the Standard Gas Equipment Corporation, 18 E. 41st St., New York, N. Y., *Gas Ranges for Apartments, Residences, and Housing Developments*, p. 9; copy in the New York Public Library.
24. "The first major development was the Lorrain oven regulator by an engineer of the American Stove Company." Cf. *American Gas Journal*, New York, May 1934, Vol. 140, p. 110.
25. Standard Gas Equipment Corporation, op. cit.: "Table top height, 36", fits in well with cabinet work."
26. Max de Nansouty, *L'Annee Industrielle*, Paris 1887, p. 14.
27. Society for Electric Development, Inc., N. Y., *The Electric Range Handbook*, New York 1919, p. 48.
28. *Electricity at the Columbian Exposition*, Chicago 1893, p. 402.
29. Society for Electric Development, op. cit.
30. H. Bohle, "The Electrical Kitchen for Private Houses," *Electricity*, New York, July-August 1924, Vol. 38.

STANDARD SPECIFICATIONS FOR CONCRETE CONSTRUCTION—I

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By JAMES D. BEACHAM, A.I.A.

Editor's Note: Progressive Architecture presents herewith a document which should prove invaluable to practicing architects and engineers. With the author's approval, these concrete specifications have been thoroughly checked by Fred N. Severud, Consulting Engineer. In the few cases where author and consultant did not agree, Mr. Severud's suggestions appear as footnotes; all such points are minor. These are not wholly "streamlined" specifications; they may be incorporated in a project specification by reference and modification. The first part is published this month; the second portion, which includes a sample project specification, will be published shortly.

S-1.	GENERAL PROVISIONS	S1-01 to S1-04.
S-2.	MATERIALS	S2-01 to S2-11.
S-3.	PROPORTIONING AND MIXING OF CONCRETE	S3-01 to S3-09.
S-4.	FORMWORK	S4-01 to S4-03.
S-5.	HANDLING AND PLACING REINFORCEMENT	S5-01 to S5-03.
S-6.	JOINTS	S6-01 to S6-04.
S-7.	CONVEYING AND PLACING CONCRETE	S7-01 to S7-06.
S-8.	CURING	S8-01 to S8-05.
S-9.	SURFACE FINISHES	S9-01 to S9-04.
S-10.	CONCRETE FLOOR FINISHES	S10-01 to S10-10.

GENERAL PROVISIONS

PART S-I.

S1-01. STANDARD SPECIFICATION.—Intent and purpose: to amplify for the Contractor the details of the materials and methods elected for the concrete construction required to complete the work called for in the accompanying project specification and drawings.

A) Scope: This Standard Specification covers various items of concrete and related work some of which may not be included in the requirements of the contract. Items inapplicable to the contract requirements (those not indicated in the requirements set forth by the project specification or drawings or according to a reasonable interpretation thereof) shall be ignored. The Contractor shall provide strong, durable concrete construction and finish throughout the work.

B) Meaning: The mention herein of materials, articles, operations, and/or methods applicable to the contract work requires that the Contractor provide each item mentioned or indicated and perform each operation prescribed, subject only to qualifications noted and conditions stated in the project specification or drawings, or otherwise specifically authorized by the Architect or Engineer; and provide therefor all necessary labor, equipment and incidentals.

S1-02. STANDARDS FOR MATERIALS and methods for judging their quality and suitability follow.

A) Reference specifications for materials:* 1) Specifications of The American Society for Testing Materials (ASTM Des.); 2) Federal Specifications (Fed. Spec.); 3) American Standards Association (ASA Spec.); 4) other reference or standard specifications mentioned in the project specification or drawings.

1) *Editions in effect at the date of proposals. Copies of applicable reference specifications mentioned obtained by the Contractor, from the respective organizations.

S3-03. INSPECTION.—All materials subject to inspection and approval prior to their delivery at job site, by the Architect or Engineer; all such inspection desired by the Owner at his expense.

1) Materials proportioned, mixed and placed only in presence of the Architect or Engineer; ample notice given by Contractor prior to starting such work.

S1-04. TESTS.—All materials and products subject to Owner's tests at source of manufacture or production, or places other than the site; all such tests desired by the Owner at his expense.

1) Notice to be given: Owner to Contractor, as to materials to be included; ample notice prior to shipping or delivery schedule given by Contractor to Owner.

A) Required tests by Contractor: all desired by Owner as proof of conformance of materials and/or products not tested at production source with specifications; all such tests made at Contractor's expense under appropriate arrangements initiated by him, by professional agency or agencies approved in advance by the Owner.

MATERIALS

PART S-2.

S2-01. CEMENT.—General: A well-known, approved brand used; type or types indicated, conforming by approved laboratory tests and certification to the standards of quality required.

A) Portland cement: Standard (normal) type ASTM Des. C 150-44 or Fed. Spec. SS-C-191, used throughout work unless otherwise required by the project specification or drawings.

B) Other cements: When and as called for by project specification or drawings, such types as "high early-strength Portland"; "moderate-heat-of hardening"; "sulphate-resisting"; "low-heat of hydration"; "hydraulic", and "natural" cement used; each conforming to the current standard requirements of the reference specifications. (S1--02).

S2-02. ADMIXTURES.—Used only when and as called for by project specification or drawings, or when specifically authorized.

A) Hydrated lime: In accord with ASTM Des. C 6-31 or Fed. Spec. SS-L-351.

B) Silicious type: A finely divided inorganic material approved by the Architect or Engineer.

C) Calcium Chloride: In accord with ASTM Des. D 98-34.

S2-03. WATER.—Clean, free from oil, acids, and injurious amounts of vegetable matter, alkalies or other salts; of drinkable quality.

S2-04. AGGREGATES.—General: All aggregates in general accord with applicable requirements of ASTM Des. C 33-44; materials as described herein, following, unless otherwise provided by the project specification or drawings.

S2-05. FINE AGGREGATE:—Material: Clean, strong, natural sand, or (subject to approval and authorization as to use) other inert material suitable for the work to be done, having characteristics similar to natural sand; free from frosted or frozen materials; all meeting the following specific requirements.

A) Grading: Coarse-to-fine; sizes indicated in project specification or drawings; in absence of specific indication, the following grading used* (by weight on standard sieves).

Total passing	for massive concrete	for building concrete
No. 4 Sieve	95—100%	100%
" 16 "	45— 80	
" 30 "		45—75
" 50 "	10—30	12—30
" 100 "	2—10	2—10

*Table not applicable for use with materials other than natural sand.

S2-06. COARSE AGGREGATE.—Material: Strong, clean, crushed granite or limestone, or gravel; or subject to approval as to use, other inert materials having similar characteristics; free

TABLE I—Aggregate Required grading

	(3")	(2")	(1½")	(1")	(¾")	(½")	(⅜")	(NO. 4)
¾"				100	90-100		30-55	0-10
1 "			100	90-100		25-60		0-10
1½"		100	95-100		35-70		10-30	0-5
2 "		95-100		35-70		10-30		0-5
3 "	95-100		50-80		20-60	10-20		0-5

TABLE II—Aggregate Maximum size of aggregate for:

Minimum dimension of section (in.)	Reinforced walls, beams and columns	Unreinforced walls	Heavily reinforced slabs	Lightly reinforced or unreinforced slabs
2½ to 5	¾"	¾"	¾"	1"
6 to 11	1½"	1½"	1½"	2"
12 to 29	2"	3"	2"	3"

from adherent coatings, and injurious amount of friable or fragile pieces, flats, organic matter or other deleterious substances; all meeting the following specific requirements.

A) **Blast-furnace slag:** (used only when and as called for in project specification, or when specifically authorized) broken air-cooled material having angular fragments reasonably uniform in density and quality; reasonably free from thin, elongated, or glassy pieces, dirt and other objectionable matter; weighing not less than 70 lbs. per cu. ft.

B) **Grading:** Material conforming to following requirements (% by weight on standard sieves).

1) **Max. size aggregate as specified.**

See Table I

2) Maximum size of coarse aggregate not larger than 1/5 of narrowest dimension of a concrete member or slab, nor larger than ¾ the clear space between reinforcing bars; in no case larger than 3". In absence of specific indication in project specification or drawings, sizes used determined from applicable requirements of Table II.

See Table II

S2-07. SAMPLES of proposed or approved materials required as follows:

	Fine aggregate	Coarse aggregate
1) Representative material for each 150 tons of aggregate	25 Lbs.	50 Lbs.

S2-08. METAL REINFORCEMENT.—All materials and accessories free from rust scale, grease, clay, and other coatings and foreign substances which may impair their bond with concrete.

A) **Bars:** of structural grade (unless other grade or grades called for in project specification or drawings), new billet steel; deformed (except ¼" bars, which may be plain, round), in accord with ASTM Des. A 15-39 or Fed. Spec. QQ-B-71.

B) **Steel wire:** of cold-drawn steel quality for use in securing reinforcement in place; in accord with ASTM Des. A 82-34.

C) **Fabricated types:** 1) bar or rod mats having all intersections secured by welding or by approved mechanical ties; material in accord with designated requirements for reinforcing bars including ASTM Des. A 184-37.

2) Woven or electrically welded wire fabric: 6" x 6" mesh of 0.192" nominal diameter wire weighing approximately 42 lbs. per 100 sq. ft., conforming to ASTM Des. A 185-37.

3) Paper-backed wire fabric reinforcement (for thin slabs over steel joists or light steel framing): 3" x 4" mesh fabric of #12 ga. galvanized wire conforming to A.S.T.M. specification A 185, attached to a strong water-resistant backing; equal to Pittsburgh Steel Co's "Steeltex Floor Lath".

D)* **Bar supports, chairs, spacers, spotters, etc:** suitable types as approved; adequate to avoid displacement of reinforcement during construction.

S2-09. JOINT FILLER.—Preformed, non-extruding resilient type, in accord with ASTM Des. D 544-41; full width and depth of concrete section; ½" thickness bituminous joint material used unless otherwise provided in project specification or drawings.

A) **Bituminous joint material:** of asphaltic or tar composition provided with stiffener strips; bitumen-impregnated uniformly with suitable filler; remaining undeformed by ordinary handling in hot weather, and not becoming hard or brittle in cold weather.

B) **Cork material:** of clean, granulated cork particles relatively free from hard particles and dust, bonded thoroughly by suitable resin or rubber compound; remaining undeformed and unbroken by twisting, bending and ordinary handling, or by standard tests required by the Architect or Engineer; type 1 used (unless other type or types specified).

S2-10. STORAGE.—All materials stored in approved facilities provided by Contractor, in manner affording convenient access for identification and inspection, at all times.

A) **Cement, lime, admixtures, etc.:** stored in suitable weatherproof, properly-ventilated buildings with dry floors.

B) **Aggregates:** stored on areas covered with

** S2-08: (D). In concrete ceilings or soffits required to be painted, avoid bar chairs that dent formwork, and also avoid concrete briquettes for bar support.*

NOTES ON USE OF STANDARD SPECIFICATIONS

FOR CONCRETE CONSTRUCTION

SUGGESTED APPLICATION.—The Architect or Engineer will prepare his Standard Specification, in manner similar to the accompanying data, adequate and comprehensive to the extent required for his general practice, and including appendices pages thereto for use in uncommon operations. A copy of the Standard Specification and applicable Standard Appendices will be furnished with each set of bidding data issued. **(See accompanying "Specimen Project Specification" for illustrated application).**

NECESSARY SUPPLEMENTARY DATA.—Includes specific information in the project specification and/or drawings giving reference data and necessary modifications of applicable provisions of the Standard Specification and its appendices, as follows:

a) As to **standard specification:** Make reference thereto stating, in effect, that all applicable provisions found therein shall be considered as part of the conditions covering the construction work to be performed. (S1-01)

b) As to **aggregates:** If use of fine material other than natural sand will be required or permitted, designate materials and give grading requirements. (S2-05)
If use of slag or other manufactured coarse material will be required or permitted, designate material. (S2-06)

c) As to **reinforcement:** Show sizes, details and locations on plans. If other than "structural" grade bars are wanted, specify other desired grades. (S2-08)
Specify or indicate type, size and weight of fabric-type reinforcing wanted, if any, should characteristics of material called for in S2-08C be unsuitable for project requirements.

d) As to **joint filler:** Designate type of joint filler required, if any, other than bituminous type; and thickness wanted if ½" thickness is unsuitable. (S2-09)

e) As to **proportioning of concrete mixtures:** Specify proportioning method elected and give data therefor as follows: For Method "A", class(es) of concrete for use, generally, or for various parts of the work. See Table "A" in Part 3.
For Method "B", (S3-01A), -03), include design data, presented in the following table.

Table B.

Class	Minimum allowable compressive strength at 28 days; p.s.in.	Maximum allowable net water content per sack of cement; gals.	Consistency range in slump; inches	Maximum size of coarse aggregate; inches
(1)	(2)	(3)	(4)	(5)

For Method "C", specify proportions of cement, aggregates and water required. (S3-01C). See Table "A" for recommended values.

f) As to **special types of cement:** If any special cements are required, specify type, and locations and instructions for use. (S2-01B)

g) As to **admixtures:** If any are required, specify type and conditions for use. (S2-02 and S3-08)

h) As to **volumetric measuring:** If this method will be permitted in lieu of weight measuring, without limitation, so specify. (S3-05A)

i) As to **ready-mixed concrete:** If this will be acceptable, so specify. (S3-06C)

j) As to **mechanical vibration:** Specify extent of work, or locations, where vibration of concrete will be required, if any. (S7-04)

k) As to **lined forms:** If lined forms are required, so indicate. (S4-02)

l) As to **concrete placed under water:** Indicate extent and design characteristics of any concrete to be so placed. (Appendix 4)

m) As to **high early-strength concrete:** Specify locations or extent to which this material will be used, if any. (S3-07)

n) As to **special concretes:** If any such concretes as "Lightweight", "Fireproofing", "Rubble", or "Cyclopean" are required, designate type(s) and indicate locations for use. See "appendices" pages.

o) As to **seal-coat curing:** Specify use of this method, if such is required, giving locations or class of work affected. (S6-02B)

p) As to **heat-curing:** Specify this method for parts of interior work to be constructed, if any, in extreme cold weather. (Appendix 5)

q) As to **special surface finishes:** Specify or indicate type(s) desired, if any. (S9-04 and Appendix 6)

r) As to **types of floor finish:** Specify type(s) wanted other than Type "A", if any. Specify and/or indicate thickness if more than minimum called for is required. (S10-01 and S10-03, -04, -05, and -06). Specify preference, if any, for "monolithic" or "separate" topping in connection with use of Type "A" finish.

s) As to **metal division strips:** Indicate type, size and locations of such strips required, if any. (S10-08B)

t) As to **cement base:** Indicate extent and design of cement base wanted, if any. (S10-09)

OPTIONAL DATA.—Should the Architect or Engineer wish to indicate in the specification his preference for certain makes of materials or articles, it is suggested that he include a statement to the effect that where names of manufacturers and trade-names appear, such mention is intended to be descriptive, but not restrictive; that the information is given to indicate to the Contractor the type and quality that will be acceptable.

tightly-laid wood planks, or other approved hard, smooth and clean surface; in manner precluding foreign material; aggregates of different classes stored in separate piles, in horizontal layers not more than 4' in depth.

C) **Reinforcement:** Material, including accessories, stored in manner preventing objectionable changes in original surface characteristics; in separate piles or racks; above grade.

S2-11. *POROUS FILL UNDER SLABS ON GROUND.—Gravel or crushed stone graded between 3/8" and 1½" in size, or a combination of gravel, or stone, and coarse sand.

PROPORTIONING AND MIXING OF CONCRETE

PART S-3.

S3-01. PROPORTIONING—done according to the method designated in the project specification or drawings, using one or more of the methods following as described herein. In absence of specific designation, Method "A" used.

A) **Method A:** a proportion determined by the Architect or Engineer following trial and adjustment of tentative mixes on the job; based primarily on the class of concrete designated and the proportions therefor indicated in Table "A", using the materials specified in Part S-2.

B) **Method B:** a proportion determined by the Contractor, providing concrete of the minimum strengths (compressive and/or flexural) designated and having characteristics as indicated in the project specification or drawings.

C) **Method C:** the fixed proportion given in the project specification or drawings, used throughout the work unless otherwise directed or authorized by the Architect or Engineer.

S3-02. SPECIFIC REQUIREMENTS FOR METHOD A.—Estimates based on cement factor and quantity of fine aggregate within range of the class of concrete specified as indicated in columns (7) and (3) respectively, of Table "A"; in case of radical departure therefrom, as directed, equitable adjustment made in contract price.

A) **Quantity of fine aggregate:** variable within limits indicated in column (5) of Table "A", as necessary to obtain proper workability and a smooth, dense, homogeneous, plastic mixture, free from segregation; such variations as approved or directed.

B) **Quantity of mixing water:** Maximum indicated includes free water on the aggregates; moisture absorbed in the aggregates not to be included.

C) **Slump of mixture:** as directed or approved; lowest slump compatible with proper placing used. In absence of specific designation or directions, applicable values of table in Par. S3-04 govern.

D) **Verification of strengths:** Concrete strengths verified during the progress of work at intervals directed by the Architect or Engineer, by testing cylinders of samples taken at the mixer.

1) Upon establishment by preliminary tests of the ratio of 7-day and 28-day strengths, 7-day strengths taken as satisfactory indication of 28-day strengths.

2) Increase or decrease in quantity of cement required by Table "A", may be ordered by the Architect or Engineer as necessary to produce concrete of the indicated strength or desired workability, subject to equitable adjustment in contract price in accordance with terms of the contract.

E) **Trial batches:** Without exceeding water-cement ratio and slump designated, full-size trial batches made by Contractor to establish correct proportions to give proper workability; proportions of fine and coarse aggregate adjusted within limits of column (5) of Table "A" until the workability of the mixture meets with the approval of the Architect or Engineer.

S3-03. SPECIFIC REQUIREMENTS FOR METHOD B.—Intent: Secure for every part of the work concrete of homogeneous structure which, when hardened, will have the required strength and resistance to weathering when made in accordance with the limiting requirements indicated in the project specification or drawings; including the following:

1) Class of concrete; 2) Minimum allowable strengths (compressive and/or flexural as required) at 28 days; 3) Maximum allowable, net water content per sack of cement; 4) Consistency range in slump; 5) Maximum size of coarse aggregate. All values based on use of normal Portland cement, and aggregates and water meeting the requirements given in Part S-2 of this specification. (Maximum allowable, net water content is the total water in the mixture at time of mixing, not including water absorbed by the aggregates.

A) **Determination of strengths:** accomplished as in case of Method "A" proportioning; [S3-02 (D).]

B) **Determination of proportions:** by means of certified laboratory tests of concrete made with the materials approved for use on the work.

1) Samples of materials proposed for use by the Contractor submitted to Architect or Engineer, for approval, at least 35 days prior to beginning of concrete work.

2)* Statement of proportions proposed by Contractor for concrete mixture submitted prior to beginning of concrete work, accompanied by a detailed report from an approved testing laboratory showing, for at least 3 different water contents, the 7-day and 28-day concrete strengths obtained when using the materials proposed for the work; such determinations based on not less than 5 concrete test specimens for each age and each water content.

3) Architect's or Engineer's right: to make all desired check-tests of concrete, using materials proposed or in use, and to order such changes as may be necessary to meet requirements of the contract.

4) Ratio between the 7-day and 28-day strengths established by preliminary tests used to determine the 7-day strengths necessary to satisfy the 28-day strength requirements indicated; ratio modified as work progresses as may be indicated by the results of field tests.

C) **Workability:** Concrete mixture such as to be workable readily into corners and angles of forms and around reinforcement, without permitting the materials to segregate or free water to collect on surface; proportions of cement and aggregate adjusted as may be necessary to produce a mixture easily placable at all times.

D) **Mechanical vibration:** When used (where specified or authorized) for compacting concrete, limiting consistencies modified only on the approval of the Architect or Engineer; required consistency for workability, as specified, satisfied.

E) **Changes by Architect or Engineer:** may be made during progress of work should it be found impracticable to obtain concrete of required workability and strength with materials being furnished by the Contractor; in such cases, changes in proportions or materials, or both, made as may be necessary to secure desired properties, subject to the limiting requirements indicated; all such changes made at Contractor's expense and no extra compensation allowed by reason thereof.

F) **Changes by Contractor:** Materials originally approved may be changed by Contractor, during progress of work, because of objectionable changes in initial characteristics of materials or for other justifiable reasons; provided conclusive evidence satisfactory to the Architect or Engineer is submitted showing that new materials or conditions proposed will produce concrete meeting the requirements indicated, and will not bring about objectionable changes in the color or appearance of the exposed surfaces.

G) **Changes in requirements:** by Architect or Engineer, in order at any time during progress of work, regardless of limitations indicated; changes in materials or proportions, or both, considered necessary to meet the requirements of the structure; in such cases, Contractor compensated in accordance with terms of contract for additional cost of materials and for additional handling and placing costs, if any, entailed by changed conditions.

S3-04. SLUMP REQUIREMENTS.—Applicable values of following table used unless otherwise directed, or in absence of specific designation in project specification or drawings.

1) Type of Construction	Slump Max.	Slump Min.
Heavy mass construction	3"	1"
Pavements	3"	2"
Plain footings and substructure walls	4"	1"
Reinforced foundation walls and footings, and thin plain walls	5"	2"
Slabs, beams, and reinforced walls and building columns	6"	3"

With use of high-frequency vibrators, slump values reduced about one-third.

S3-05. MEASUREMENT OF MATERIALS.—Cement and aggregates for concrete requirements involving a total of more than 50 cu. yds., measured by direct weight upon suitable weighing devices approved by the Architect or Engineer, or subject to specific authorization, other suitable and approved methods; accuracy of weighing devices such that successive quantities can be measured to within 1% of desired amounts. Each size aggregate and bulk cement weighed separately:

1) Mixing water measured by weight or volume, by device susceptible of control accurate to plus or minus ½ of 1% of the capacity of the storage tank.

A) **Volumetric measuring:** (used only under conditions specified in Par. S3-05, or when specifically authorized) comprises the transposition of weight proportions indicated to equivalent volumetric proportions, as checked and approved by the Architect or Engineer; suitable allowances made for variations in the moisture condition of the aggregates, including the bulking effect in fine aggregate.

S3-06. MIXING.—All concrete machine-mixed, at site or at Contractor's central plant, unless otherwise specified or authorized.

A) **Equipment:** modern mixer or mixers capable of producing homogeneous mixtures of uni-

TABLE A

Based on 3" Slump. See Note Below Table.

Class of concrete and max. size of aggregate (in.)	Maximum water per sack cement (gal.)	Gravel % Sand (For F.M. range from 2.20 to 3.2)	Stone % Sand (For F.M. range from 2.2 to 3.2)	Gravel Minimum amount of cement (sacks)	Stone Minimum amount of cement (sacks)
A— ¾	8	41-47	46-52	4.6	5.0
A—1	8	38-44	43-49	4.5	4.9
A—1½	8	34-40	39-45	4.3	4.6
A—2	8	32-38	37-43	4.0	4.4
B— ¾	7½	41-47	46-52	4.9	5.3
B—1	7½	38-44	43-49	4.8	5.2
B—1½	7½	34-40	39-45	4.5	4.9
B—2	7½	32-38	37-43	4.3	4.7
C— ¾	7	41-47	46-52	5.3	5.7
C—1	7	38-44	43-49	5.1	5.6
C—1½	7	34-40	39-45	4.9	5.3
C—2	7	32-38	37-43	4.6	5.0
D— ¾	6½	41-47	46-52	5.7	6.2
D—1	6½	38-44	43-49	5.5	6.0
D—1½	6½	34-40	39-45	5.2	5.7
D—2	6½	32-38	37-43	4.9	5.4
E— ¾	6	41-47	46-52	6.2	6.7
E—1	6	38-44	43-49	6.0	6.5
E—1½	6	34-40	39-45	5.7	6.2
E—2	6	32-38	37-43	5.3	5.8

Increase water content 3 per cent for each 1 in. increase in slump. Add cement to maintain water cement ratio.

** S2-11: Many designers specify that porous fill be covered with building paper to prevent loss of wet concrete. This practice requires additional care in placing concrete to prevent puncturing the paper.*

S3-03: (B. 2) Many architects and engineers require the mix selected to show laboratory test results 15% higher than the design strength, to allow for field irregularities.

form color, and of discharging the mixtures without segregation; equipment at mixing plant so constructed that all materials, including water, entering mixer drum can be accurately proportioned and will be under control; devices for weighing aggregate and cement specially designed for that purpose; all equipment subject to approval of the Architect or Engineer.

B) **Machine mixing:** Volume of mixed material, per batch, according to manufacturer's rated capacity, not exceeded; mixing continued for not less than 1 minute (or longer as directed), and with drum rotating at peripheral speed of not less than 190' per minute throughout the mixing period, when all the materials are in the mixer; the entire batch discharged before mixer is recharged; retempering of concrete or mortar not allowed.

1) Initial mixing at plant not required when concrete is to be transported to job site in approved revolving-drum type truck mixers.

C) **Ready-mixed concrete:** (used only when called for or allowed by project specification or drawings, or when authorized); in accord with ASTM Des. C 94-43T.; plant properly equipped in all respects for accurate proportioning and proper mixing and delivery of the concrete, including accurate water measurement and control; plant of sufficient capacity and having sufficient transportation equipment to deliver concrete at the desired rate; all conditions subject to the approval of the Architect or Engineer.

D) **Delivery to job-site:** Concrete transported in clean, watertight receptacles equipped with an agitator device which, following initial mixing of concrete at the plant, will operate until the load is discharged; or in revolving-drum type truck mixers in which the concrete materials, in the proportions required, are placed and the drum revolved until the mixture is discharged, at a speed of not less than 4 r.p.m., or for not less than 4 minutes after all materials are in the mixer.

1) Interval between batches for a pour not to exceed 30 minutes; elapsed time between discharge from mixer and placing concrete not to exceed 1 hour.

E) **Hand mixing:** method used only when specifically authorized.

1) **Equipment and procedure:** watertight platform; mixing done in manner insuring a uniform distribution of materials throughout the mass; mixing continued until a homogeneous mixture of the required consistency is obtained.

S3-07. HIGH EARLY-STRENGTH CONCRETE. — High early-strength type Portland cement used only when and where called for in the project specification or drawings, or when specifically authorized; requirements for such concrete, generally, the same as specified for normal Portland cement concrete, except that estimated 28-day strengths indicated for normal cement taken as estimated 7-day strengths when high early-strength Portland cement is used.

S3-08. ADMIXTURES.—Hydrated lime or silicious admixtures used only when and as called for in the project specification or drawings or when specifically authorized by the Architect or Engineer. Use of calcium chloride in concrete avoided where exposed surfaces will be painted.

S3-09. TESTS OF CONCRETE.—During progress of work, tests made of specimen pieces of concrete to determine whether the concrete as produced complies with the standards of quality specified. Under proportioning methods "A" and "C", desired tests made by a laboratory employed by Owner (Contractor's cooperation required to extent of allowing access to work for selection of samples and storing and protecting samples and specimens, in a manner preventing injury or loss through his operations). Under proportioning method "B", tests made by laboratory acceptable to Owner, at Contractor's expense.

A) **Test pieces:** Sample of concrete taken at the mixer, or from transportation vehicle during discharge; 3 cylinders or beams made for each class of concrete used in any one day's operation; specimens molded immediately in accord with the requirements of ASTM Des. C 31-42, placed in a protected spot, and kept 24 hours under moist curing conditions at approximately 70 deg. F.; then transported to testing laboratory.

B) **Laboratory testing:** Specimens kept under standard moist curing conditions at approximately 70 deg. F., until tested; tests made at 7 days and 28 days in accordance with designated methods following; upon establishment of relationship between 7-day and 28-day strengths, 7-day test results used as an indication of probable 28-day strengths.

1) Method for compression tests, ASTM Des. C 39-42. Method for flexure tests, ASTM Des. C 78-39.

FORMWORK

PART S-4.

S4-01. FORMS.—General: Suitable and adequate forms provided conforming to the shape, lines, grades and dimensions of the concrete called for in the project drawings; exposed surfaces produced having smooth appearance practically free from offsets, fins, honeycomb, and other objectionable defects. For forms for architectural concrete see S4-02.

1) Responsibility for adequacy and safety of forms rests with the Contractor, but design of all such work subject to approval of the Architect or Engineer.

2) All work done in accordance with specific requirements following.

A) **Materials:** wood, metal or other approved material used for contact surfaces; free from objectionable surface defects that may affect the finished concrete; material optional with Contractor unless specific requirements are indicated in project specifications or drawings.

1) Lumber forms: No. 2 common or better, reasonably-dry yellow pine or other approved species used for form lumber; for exposed work, contact boards dressed and tongue-and-grooved.

2) Plywood forms: of approved grade and quality; made for use as concrete forms.

3) Metal forms: Surfaces free from irregularities, dents and sags; pans used for floor construction not less than 16 ga. metal; forms for concrete joist construction in accord with ASA Spec. A 48-1932.

4) Sectional or patented forms: used only if specified or authorized, under conditions approved by the Architect or Engineer.

B) **Form ties:** Bolts and rods, of adjustable type to permit tightening forms; so arranged that upon removal of forms no metal is within 1" of any exposed concrete surface; no wire ties used where concrete surfaces will be exposed to weathering.

C) **Design and construction:** Forms mortar-tight; well-braced, tied and supported so as to maintain the desired position and shape during and after pouring concrete; trussed supports provided where adequate foundations for shores cannot be secured; forms for heavy beams and similar members constructed with suitable camber as directed; all forms designed for removal without injury to the concrete.

1) Knot holes and broken places in wood contact forms covered with metal patches; adequate temporary openings provided where necessary for cleaning and inspection of forms; where indicated, suitable mouldings placed in forms to shape the edges or surfaces of concrete members.

2) In water-front structures, forms made watertight below high-water level.

D) **Oiling:** Contact forms for exposed concrete surfaces coated with non-staining mineral oil applied immediately before reinforcement is placed.

S4-02. FORMS FOR ARCHITECTURAL CONCRETE.—General: Requirements of **S4-01** apply, except as modified herein or otherwise directed; type of contact forms as required by project specification or drawings; of plywood; lined or unlined as designated.

A) **Materials:** All subject to inspection on site and approval as to use, by the Architect or Engineer; lumber forms (No. 2 common or better grade), dry, dressed-and-matched, tongue-and-groove boards.

1) Plywood forms: of 5-ply Douglas fir structural plywood of "concrete form" grade; of adequate thickness, and largest standard-size sheets available, each piece grade-marked.

2) Form linings: of strong, non-warping, fiberboard having a smooth, hard surface on the contact side; not less than 3/16" thick; processed to resist moisture; or ¼" thick Douglas fir plywood in largest practicable-size sheets to obtain the minimum number of joints.

B) **Design and construction:** Studs and wales provided having face widths of not less than 3" at joints of ⅝" plywood form boxing; studs spaced 12" o.c.; wales not more than 24" o.c.

1) Full-size plywood sheets used except where smaller pieces will cover an entire area; panel forms used only where a single panel will cover an entire area from one reveal to another; straight edges and tight, close-fitting joints provided; all abutting sheets nailed to the same stud or wale immediately supporting such units.

2)* In lined forms, joints in lining and form boxing not to occur at the same point: abutting edges of adjacent lining sheets nailed to the same board, and applied and secured so as to prevent buckling; linings installed with 1/16" joints between adjacent sheets; pieces accurately fitted and joints filled with mixture of equal parts of beef tallow and Portland cement, or with other approved material.

S4-03. SETTING MISCELLANEOUS ITEMS.—Required anchors, bolts, inserts, supports, hangers, pipe sleeves, conduits, drains, etc. (furnished under another section of the specifications and set under this section), occurring in connection with concrete work, placed and secured in position before concrete mixture is deposited.

HANDLING AND PLACING REINFORCEMENT

PART S-5.

S5-01. GENERAL.—Reinforcing formed and installed as indicated or required; bolts, ties, chairs, spacers, supports, and other devices necessary to properly install reinforcing, furnished and placed.

A) **All reinforcement and accessories** free at time of pouring from injurious amounts of rust scale and other coatings, and from foreign substances tending to impair the bond with concrete.

B) **Shop drawings** furnished by Contractor, showing pertinent details of required reinforcement including location, size and length of each bar and unit, bar list and bending diagrams; adequate copies furnished as directed.

S5-02.* FORMING.—Fabrication: Bars bent cold; formed to dimensions indicated or approved; bar bends (stirrup and tie bars) made around pins having a diameter of at least twice the thickness of such bars; 1" and smaller bars, 6 times; larger bars, 8 times.

A) **Straightening or rebending:** not allowed to extent that will injure reinforcing materials; no heat used unless specifically authorized; use of bars with kinks or bends not shown on approved plans, avoided.

S5-03. PLACING.—General: Reinforcing materials accurately positioned and strongly secured against displacement, using annealed-iron wire ties or suitable clips at intersections; supported by metal or concrete chairs, metal spacers or hangers (all of approved type and size) in a manner keeping all metal away from exposed concrete surfaces.

A) **Spacing:** as shown by approved drawings; where not shown, minimum clear space between parallel bars twice the diameter of round bars (2½ times the side dimension of square bars); but in no case less than 1½ times the designated maximum size of coarse aggregate used in the concrete, nor less than 1" in beams and girders or less than 1½ in columns.

B) **Moisture protection:** Reinforcing adjacent to surfaces installed so as to provide adequate coverage; as shown by approved drawings; where not shown, requirements following apply.

1) Concrete not exposed to weather: Bars parallel to exterior surface of any member bedded at least one diameter, for round bars (or the diagonal dimension in the case of square bars), but in no case less than ¾" clear from an exterior surface.

2) Coverage at bottom: at least 3" provided for concrete placed directly on ground or on earth fill.

3) Concrete exposed to weather: reinforcement protected by not less than 2" of concrete for bars larger than ⅝"; 1½" for ⅝" and smaller bars; at least 1" protection provided at underside of slabs raised above ground.

C) **Splicing reinforcement:** Necessary and authorized bar splices, not shown on approved drawings, made as directed or approved by the Architect or Engineer; all bars lapped sufficiently to develop the strength of the bar by bond, and securely wired, splices in adjacent bars staggered; adjacent sheets of wire mesh lapped at least 6" and securely wired together.

D) **Future bonding:** For future construction in-

** S4-02: (B. 2) Concrete ceilings or soffits required to be painted shall be constructed to produce reasonably smooth and dense surfaces, free from bulges and depressions, except for tolerance listed below, and free from fins projecting more than 1/32" or offsets in surfaces more than 1/32". A tolerance of ¼" from the level in 10'-0" will be accepted.*

S5-02: Unless specifically shown on drawings, contractor to submit for approval arrangement of bars at column splices.

dicated, exposed reinforcement shown on approved drawings provided with adequate protection from corrosion, by wrappings of burlap saturated with bituminous material.

JOINTS

PART S-6.

S6-01. CONSTRUCTION JOINTS.—General: Work planned by Contractor so as to use practicable minimum of such joints; type number and location in each member, unit or section of structures subject to approval, prior to placing concrete, by Architect or Engineer.

A) **Location:** where shown on approved drawings or as directed or authorized; generally, approved type construction joints uniformly placed at locations described following.

1) In floors on ground or fill: On column lines or similar divisions; at centers of slabs between such points.

2) In framed floors and roofs: At middle of spans in slabs, beams and girders, except where intersecting members occur at such points; in all such cases, joint offset a distance approximately equal to twice the width of the intersecting member and provided with approved supplementary reinforcing.

3) In columns: At underside of floor or roof members, and at floor levels.

4) In walls: Horizontal construction joints avoided in walls below grade and in one-story walls above grade; otherwise, joints located at well-defined horizontal lines such as window sills, heads, belt courses, etc.

B) **Design:** Joints in all horizontal members made vertically; tongue-and-groove joints provided at center of depth in beams and girders, and in slabs if required; specified reinforcement continued through joints.

C) **Forming:** Hardened concrete roughened, cleaned and grouted with Portland cement mortar before being connected with new material.

1) Beams, girders, brackets, haunches, column caps, etc., considered as part of, and built continuous with, floors, walls and roofs, and placement monolithically therewith required following elapse of not less than 2 hours after depositing concrete in vertical supporting members.

S6-02. EXPANSION AND CONTRACTION JOINTS. —General: Adequate isolation joints or separations provided in the several parts of the construction as necessary to allow them to expand and contract within anticipated variations in temperature or moisture conditions; such joints made watertight where transmission of water may be imminent; use of shear dowels, filler material, caulking, water stops, etc., included to extent indicated or specifically required.

A) **Location and design:** Joints provided in slabs on ground or fill at all walls and similar vertical members, and around columns and foundations; at points and of type and design indicated in project specification or drawings or directed or authorized.

S6-03. SHEAR REINFORCEMENT.—Adequate provisions made to resist shear action across adjacent sections, to extent indicated or directed, at all joints.

1) Approved construction joints in reinforced concrete provided with additional steel reinforcement as approved or directed by the Architect or Engineer; no additional compensation allowed the Contractor for such work.

2) For concrete without reinforcement, adequate shearing strength at construction joints provided by forming a tongue-and-groove joint or by means of dowel bars, as the Architect or Engineer may direct.

CONVEYING AND PLACING CONCRETE

PART S-7.

S7-01. GENERAL.—Conveying, transporting and placing done as rapidly as practicable, manually or by approved mechanical means preventing the segregation or loss of ingredients; unnecessary rehandling avoided.

A) **Placing:** Each unit and section placed and formed as a monolithic structure the component parts of which are securely bonded together; free from an excessive amount of pits, honeycomb, and visible lines of juncture at construction joints; corners sharp; surfaces smooth and of uniform color throughout. Mechanical type placing equipment of adequate capacity for project work, suitable, as approved.

1) Concrete placed or discharged into forms before its initial set; in any event, not more than 30 minutes after its mixing. No retempered concrete mixture used.

2) All equipment used for conveying and placing thoroughly cleaned before each run, discharging water used for purpose outside the formwork.

S7-02. PREPARATION.—Before placing concrete, all dirt, debris and water removed from forms, trenches and excavations; position and securing of reinforcement checked; approval of Architect or Engineer given as to forms, areas, reinforcement, etc., prior to placing concrete.

S7-03. PLACING METHODS.—A) General: Concrete mixture deposited continuously in approximately horizontal layers, in a manner to prevent displacing reinforcement and the accumulation of concrete on the forms or the reinforcement above the level of the fresh concrete, and the formation of seams and planes of weakness within the sections. Construction joints used only when and where approved by the Architect or Engineer.

1) Concrete puddled with suitable tools, working around reinforcement and embedded fixtures; over-working which may result in segregation avoided.

2) In columns and other members of small dimensions, including all such location where congestion of reinforcement makes placing difficult, mortar containing only the proportion of cement and fine aggregate used in the concrete, placed in the bottom of the form, sufficiently to cover the surface; followed immediately with a deposit of the approved concrete mixture; the whole worked into place by puddling where practicable or by hammering on the forms opposite the freshly deposited concrete, or by mechanical vibration when such method is specified or authorized.

B) **Vertical sections:** filled with compacted concrete to top of 1" wood strips placed 1" above the lowest beam soffit and/or above the top of wall forms; fresh concrete struck off at top of strips; strips removed and concrete struck off cleanly after concrete has set.

C) **Dropping concrete:** Maximum allowable vertical drop 5', but concrete dropped through reinforcement (as in columns and walls) from any heights or under conditions causing segregation, avoided.

D) **Chuting:** Equipment used of such size and design as to insure continuous flow in the chutes; chutes metal or metal-lined, with all sections having a uniform, minimum slope of 1 (vertical) to 2 (horizontal); the spout maintained as near the surface of the deposit as practicable; in intermittent operations, material from chute discharged into approved type hoppers.

E) **Pneumatic placing:** Machine located as close as practicable to place of deposit; discharge end of line positioned not more than 10' from point of deposit; discharge lines horizontal in position or inclined upward from the machine.

F) **Pumping:** Equipment and operation of pump such as to produce a continuous stream of concrete free from air pockets; upon completion of pumping, concrete remaining in line, intended for further use, ejected in manner avoiding contamination of the concrete and separation of the ingredients.

S7-04. VIBRATION. — General: Compacting by mechanical vibration done when and to extent called for by project specification or drawings, as an aid to placing under difficult conditions.

1) For exposed surfaces, vibration supplemented by forking or spading along the surfaces adjacent to the forms.

2) Vibration discontinued when concrete appears to be thoroughly compacted and ceases to decrease in volume.

3) Vibration of forms and reinforcement allowable only when specifically authorized; disturbing of partially hardened concrete, and application of vibrating element to reinforcement extending into hardened or partially hardened concrete, avoided.

A) **Equipment:** High-frequency mechanical, internal vibrators of approved type, designed to operate with the vibratory element submerged in concrete, with a frequency of not less than 3,000 blows per minute.

1) Sufficient number of vibrators used to properly consolidate the concrete within 20 minutes following its deposit in forms; maximum output duty allowable for each vibrator, 20 cu. yds. per hour.

B) **Adjustment of mix:** Where necessary when compacting by vibration, concrete mix adjusted to use the practicable minimum percentage of fine aggregate and water; in every case, concrete mixture kept sufficiently plastic and workable to permit effective placing and compacting.

S7-05. PLACING IN COLD WEATHER.—General: No concrete deposited when atmospheric temperature is below 40 deg. F., or when the concrete will likely be subjected to freezing temperatures within 24 hours after placement.

1) Lumps of frozen material and ice removed from concrete materials before they are placed in mixer.

2) No salts or other chemicals, or foreign materials, used in concrete for purpose of preventing freezing.

A) **Temperature of concrete:** Not less than 50 deg. F., nor more than 120 deg. F. Heating of materials done only when and as authorized by the Architect or Engineer.

B) **Acceleration:** When called for by the project specification or drawings, or when specifically authorized, maximum of 2 lbs. of calcium chloride per sack of cement used as an accelerator; applied in the mixer in the form of a solution consisting of 4 lbs. of calcium chloride to 1 gal. water (this water included in the water-cement ratio of the concrete mixture); use of calcium chloride avoided in concrete ceilings and soffits required to be painted.

C) **Protection against freezing:** Concrete given adequate protection on all exposed sides, by straw, tarpaulins, or other practical means; use of manure or other unsuitable insulating material in contact with concrete, avoided.

S7-06. BONDING. — Methods and operations: Forms re-tightened before new concrete is deposited on or against hardened concrete.

1) Contact surfaces of hardened concrete roughened in manner thoroughly removing laitance and loosened particles of aggregate or concrete, and saturated with water.

2) Prepared surfaces parged with neat cement mortar; new concrete placed before mortar has attained its initial set.

CURING

PART S-8.

S8-01. GENERAL REQUIREMENTS.—Intent: All concrete given adequate protection from injurious action by sun, rain, flowing water, frost, freezing, mechanical injury, and premature drying out; concrete cured through protection against loss of moisture carried in the mixture, to extent developing the full anticipated strength and durability of the material.

A) **Low atmospheric conditions:** During cold weather adequate provisions made, when necessary, to maintain 50 deg. F. (min.) on surfaces of uncured, normal-cement concrete, for period of not less than 5 days after placement (for 48 hours in case of high early-strength concrete); temperature within enclosures, 100 deg. F. (max.).

S8-02. CURING.—General: Concrete surfaces effectively sealed during curing period by approved methods preventing the early evaporation of water used in the concrete mixture.

1) Whenever practicable, contact formwork left in place during curing operations.

A) **Water-curing:** used throughout unless other methods are designated or authorized; only fresh, clean water used; all surfaces kept thoroughly wetted.

1) Horizontal surfaces cured by ponding, or by application of 1" (min.) layer of sand or sawdust; other surfaces covered with cloth mats, or kept wet by continuous sprinkling or spraying.

The second and final portion of these concrete specifications will be published shortly.

REVERSE-CYCLE HEATING:

The "HEAT PUMP"

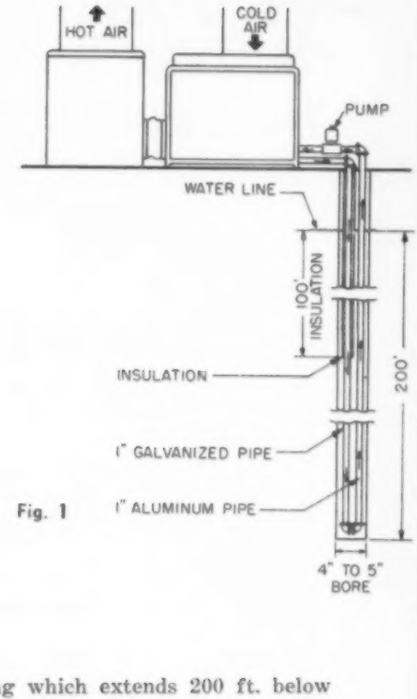


Fig. 1

Reverse-cycle heating has a history of nearly a century. In essence it is mechanical refrigeration reversed; hence the name. Lord Kelvin is credited with suggesting, almost a hundred years ago, that the same mechanism which extracts heat from the fluid employed in a mechanical refrigerator for cooling purposes, wasting the heat, might extract and use the heat for warming purposes. Devices for this purpose have also been called *heat pumps* because they "pump" heat from a lower temperature level to a higher.

Recently there have been newspaper reports of experimental installations of heat pumps about to be made by the Chattanooga Electric Power Board. These are by no means the first; the American Gas and Electric Company system has eight pumps installed, the first of them in operation since 1934, and estimates that there are some 200 installations in the U.S.A. A West Coast manufacturer has a fairly extensive 1947 production program for heat pumps. The Muncie Gear Works, of Muncie, Indiana, has a unit ready for mass production; Muncie units, reportedly, will be used at Chattanooga.

REQUIREMENTS

The two principal requirements are a heating medium of even, moderately warm temperature, and electrical current. Water, air, or earth may be the heat source; heat extracted from it is applied to an air stream which may be circulated through the building as in any warmed-air or air-conditioning system. En route the air may be cleaned, humidified, or dehumidified as desired. In some cases heat is transferred directly from air to air, in others an intermediary (water) circulation system absorbs heat from the source and transfers it to the air stream. If the water can be reheated economically it can be used repeatedly and can circulate within a closed piping system. Otherwise it must be disposed of, and fresh water drawn into the system; this might impose on urban water supplies a tremendous overload. If wells are used, there may be danger of permanently lowering the water table. But the system will undoubtedly find a market in urban areas, and consequently closed water circulation is desirable.

As to electrical consumption, tests conducted during the heating season of 1945, in which a one-story house, 30 by 28½ ft. in area, was kept at a constant day-and-night temperature of 78F, required a total of 8,070 Kwhr of current. Consumption will undoubtedly vary with the usual factors, such as local weather conditions, insulation, weatherstripping, glass type, area, etc.

ADVANTAGES

The chief advantage of reverse-cycle systems lies in their simplicity, ease of operation, and cleanliness. They can be made to furnish both winter heating and summer cooling at slight additional first cost (for controls and equipment to re-reverse the system) and at the added operating cost of the 2000 Kwhr (for the case cited) required for summer operation. The desired indoor temperature can be maintained regardless of seasonal variation, unusually cold or warm days, etc. The equipment requires no attention. As demands are made upon it, cooled or warmed air is automatically provided. The units themselves can be quite small, and there is little reason for them to require more maintenance than the average mechanical refrigerator. The process of combustion usually required in a heating system is entirely eliminated.

A TYPICAL SYSTEM

The system illustrated, known as "Marvair," is manufactured by the Muncie Gear Works, Inc., Muncie, Indiana. In general, the Marvair consists of three circulation systems: 1, a water circuit used to absorb heat from below the surface of the earth; 2, a refrigeration circuit used to transfer this heat from the water circuit to the air stream; 3, an air stream which transports the heat to the spaces to be warmed.

The water system is a closed circuit (**Fig. 1**). The pump circulates water which travels through the Marvair unit, where its heat is removed, then through 1" piping which extends 200 ft. below ground-water level, where it regains heat, then back again through the unit. Aluminum is used for the return pipe because heat can be absorbed through it easily. The pipe entering the well is 1" galvanized, inserted into 1½" galvanized pipe with the space between sealed off to act as thermal insulating dead air. Experience with test installations indicates that piping extending 200 ft. below the water table provides satisfactory results in most conditions. U. S. Geological Survey data on temperature of water from wells 30 to 60 ft. deep show that water temperatures in the populous northern industrial belt of the U.S.A. range from 62 to 47F.

The refrigeration system consists of the four elements shown in **Fig. 2**. The compressor pulls gas contained in the circuit from the water radiator, raises its pressure and temperature, and passes it on through the air radiator. Here its heat is transferred to the air stream, and in giving up heat, the gas condenses back into a liquid which travels through an expansion valve into the water radiator, where it vaporizes and picks up heat from the water circuit. When cooling is required, automatic controls reverse the refrigeration system.

The air system utilizes conventional ducts, fan, filters, and dehumidification. A single control unit, once set at the desired temperature, will maintain temperatures within prescribed limits regardless of outdoor conditions.

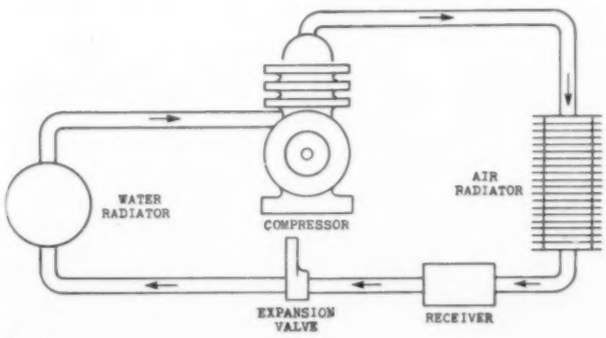
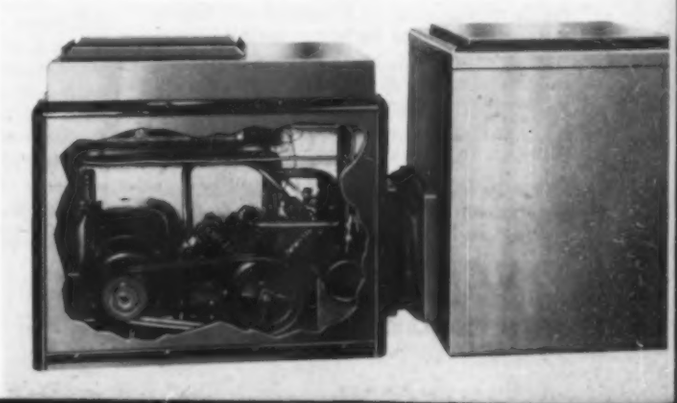


Fig. 2

The "Marvair" heat pump is only waist-high.



from the TECHNICAL PRESS

By JOHN RANNELLS

BOOKS

Fluorescent Lighting. *A.D.S. Atkinson. Chemical Publishing Co., Inc., 26 Court St., Brooklyn, N. Y. 144 pp. 5½" x 8½", illus., diagrams, index. 1946. $3.50*

The first comprehensive treatise on fluorescent lighting which has come to our attention, this book was written primarily for electrical engineers in Great Britain. It is so clearly and simply written that architects and other "laymen" can get a clear picture from it of the theories and facts. The slight differences in terminology and current (50 cycle AC, for example, instead of 60 cycle) should not bother the reader.

PAMPHLETS, REPORTS

Airline Airport Design Recommendations. *Part I: Airport Requirements, Airport Location, Classification of Airports, Aprons, Runway Clearances, Runway Configurations, January 1946. Part IV: Airport Lighting, May 1946. Air Transport Association of America, 1107 16th St., N.W., Washington, D. C. 45 pp.; 33 pp.; 8½" x 11", diagrams, tables. Free*

A "must" for all those concerned in planning and development of airport facilities, this series presents the "considered opinions and mature judgment" of the entire air transport industry. The sort of broad thinking displayed here (backed by solid factual material) should always form the basis of any planning effort. These "design recommendations" might even serve as a standard of planning procedure in other fields, to be cited by architects as an example of the way to tackle a problem.

Part I, especially the first two sections, is a brief but comprehensive treatise on planning, with due regard to changing conditions which the master plan of each development will have to accommodate. Typical runway patterns are given in detail (drawings, data, discussion) and comparative data for all types are given in tabular form.

Part IV gives airport lighting designs which will fill the operational requirements of the various types of airports in accordance with standards established by joint civil aeronautics and military authority. Double-page drawings give typical lighting installations, wiring diagrams, and obstruction lighting requirements. Descriptions of the various equipment are given; also a "bibliography" of available specifications, drawings, and equipment sources.

Parts to follow in this series will cover: obstructions, approaches, and zoning; paving and drainage; buildings, etc.

Dear Mr. Architect. An Open Letter From the School Librarian. *American Association of School Librarians, Baton Rouge, La. Pamphlet, 13 pp., diagrams. 1946. 15 cents*

This pamphlet describes the needs of various types of school libraries from the librarian's point of view. To the architect planning any particular school it would be as useful as though he had had several conferences with a particularly intelligent librarian who would run that school's library. Covers space allowances, light, sound, furnishings and equipment, planning.

Home Construction, Second Report. *(No. 23 in a series of postwar building studies of the British Ministry of Works.) Prepared by a committee "representative of the architectural and engineering professions and of other elements of the building industry."*

The Architectural Use of Building Materials. *(No. 18 in the series.) Prepared by a committee convened by the Royal Institute of British Architects. His Majesty's Stationery Office, London, England, 1946. 68 pp.; 91 pp.; paper bound, illus.; appendices with No. 23; index with No. 18. One shilling and sixpence; two shillings and sixpence. Available on order from the British Information Services, 30 Rockefeller Plaza, New York, N. Y., at 50 cents and 75 cents.*

House Construction, the first of this series (reviewed in *Pencil Points*, July 1945) covered "materials and methods of construction suitable for the building of houses and flats, having regard to efficiency, economy and speed of erection" and made recommendations for postwar practice. The *Second Report* evaluates experimental houses constructed by eight builders in terms of the standards set up in the first report. Appendices cover: (a) protection of steel against corrosion, information from the British Standards Institutions; (b) condensation within roofs and walls of composite construction; (c) revised standards of fire resistance, resulting from the recommendations of the Fire Offices Committee for the draft Code of Practice on Fire Resistance.

Each house is described and there is a full-page isometric construction diagram for each. All are prefabricated, more than half with steel frame, two with concrete uprights. Floors are of steel joists, precast concrete beams, or timber. Exterior wall covering (they call it "cladding" over there) is steel, concrete slabs, asbestos cement, or brick. No comparisons are made between the various types, but results of investigation of each house are given under these headings: Strength and Stability, Resistance to Moisture Penetration, Thermal Insulation, Sound Insulation, Fire Hazard, Vermin Infestation, Maintenance and Durability. Where the investigation showed performance below the desired standard, the manufacturers have corrected their designs.

The Architectural Use of Building Materials (No. 18) is little more than a listing of materials and their uses with many nostalgic references to ancient methods and frequent deploring of modern trends. This report has a strangely antiquarian air among its straight-thinking companions.

FROM OTHER PUBLICATIONS

The Organization of Building Science Research. *Paper read at a meeting of the R.I.B.A. Architectural Science Board by Prof. J. D. Bernal, Chairman of the Scientific Advisory Committee.* Journal of the Royal Institute of British Architects, *No. 66, Portland Place, London W.C.1, England. Apr. 1946. 3 pp.*

The British are fortunate in getting their research organized on the broad lines described in this paper. The old concept of building research as examination of performance of materials has been replaced by a much wider concept: "Research now includes general sociological and economic studies aimed at formulating in the first place the needs for building in such a way that the right technical problems are presented and then further research and development for solving those problems with full regard to the human and economic aspects of the building industry." This seems too vast a program to produce early results but the urgent problems, particularly in housing, are to be tackled at once so that the "limited number of research workers can achieve those results which can most rapidly be turned to practical advantage."

The work was divided broadly into (1) requirements; (2) materials; (3) structures; (4) construction or building industry. In no case is tradition taken for granted, but everything is being tested out before fixing new requirements and putting new materials and methods into broad use. It is expected that codes will be changed to conform to current knowledge of structures and that the building industry may be largely reorganized. Studies are being made of productivity of labor and of mechanization in building, all in collaboration with representatives of employers and workers.

We could use this sort of organized research in this country.

MANUFACTURERS' LITERATURE

PROGRESSIVE ARCHITECTURE—Pencil Points, 330 West 42nd Street, New York 18, N. Y.
I should like a copy of each piece of Manufacturers' Literature listed.

We request students to send their inquiries directly to the manufacturers.

No.	No.	No.	No.
No.	No.	No.	No.
No.	No.	No.	No.
No.	No.	No.	No.

NAME

POSITION

FIRM

MAILING ADDRESS ☐ HOME ☐ BUSINESS

CITY STATE

12/46

PLEASE PRINT

★ *Editors' Note: Items starred are particularly noteworthy, due to immediate and widespread interest in their contents, to the conciseness and clarity with which information is presented, to announcement of a new, important product, or to some other factor which makes them especially valuable.*

Air and Temperature Control

★ **1-71.** *American Air Filters, Complete Catalog "A" (Form 530-40H)*, a binder of catalogs on air filters—electronic, mechanical, special types; automatic (self-cleaning), and regular. Also air cleaning, industrial units, systems, etc. Table of contents (24 bulletins), technical data, specifications, installation data, drawings. American Air Filter Company, Inc.

1-72. *Double-Pass Firebox Boilers, AIA 30-C-1 (Bulletin RM-1, Sixth Ed.)*, 8-p. illus. bulletin on riveted or welded double-pass steel firebox boilers. Description, drawings, SBI rating charts, dimensions. The Brownell Co.

1-55. *Dunham Baseboard Simplicity Heating Systems (Bulletin 639)*, C. A. Dunham Co. Reviewed November.

1-56. *Small High Pressure Pumps (D-446)*, Economy Pumps, Inc. Reviewed November.

1-68. *Fitzgibbons R-Z-U Junior Steel Boiler, AIA 30-C-1*, Fitzgibbons Boiler Co., Inc. Reviewed November.

1-57. *Carefree, Dependable Warmth (Form 4609)*, Iron Fireman Mfg. Co. (Stokers). Reviewed November.

1-58. *How To Control Radiant Heating (Booklet B)*, Johnson Service Co. Reviewed November.

1-78. *Hi-Test Kewanee Boiler, AIA 34-B-1 (Cat. 89a)*, 8-p. illus. booklet on welded two-pass Series HT boiler with refractory-lined firebox. For power service and industrial processing. Specifications, drawings, measurements. Kewanee Boiler Corp.

1-69. *Series "A" Blower Assemblies (Cat. 502)*, Lau Blower Co. Reviewed November.

1-59. *Corrosion Control in Air Conditioning—The Chromate Treatment of Their Water Systems (Serial 35)*, Mutual Chemical Co. of America. Reviewed November.

From Silent Glow Oil Burner Corp. Reviewed November:

1-60. *Junior Defender Model 600.*

1-61. *Air-Seel Model 800.*

1-62. *Senior Defender Model 1200.*

1-63. *Model 1800.*

1-64. *Model 2800.*

1-65. *Model 3800.*

1-66. *Model 6800.*

1-67. *Model 8800.*

1-80. *Kitchen-Aire Ventilation*, 4-p. illus. pamphlet on an aluminum kitchen ventilator. Description of four models; applications, advantages, and installation details. Stewart Manufacturing Co.

1-70. *Protection and Control for the Modern Home*, Watts Regulator Co. (Heating Controls). Reviewed November.

Doors and Windows

4-62. *Adlake Aluminum Windows, AIA 16-E-1*, Adams and Westlake Co. Reviewed November.

4-66. *Bilco Copper Steel Bulkheads*, The Bilco Co. Reviewed November.

★ **4-72.** *The New Corbin Unit Lock, AIA 27-B*, (10x7) broadside featuring three new unit locks for residential use—entrance door lock, bedroom or bathroom door, and other interior door locks; installation details. P. & F. Corbin Division.

4-63. *Ellison Balanced Door Unit*, Ellison Bronze Co., Inc. Reviewed November.

14-09. *Hollow Metal, AIA 16-A.* Jamestown Metal Corp. (See 14-09 under "Non-Load-Bearing Structures.")

4-73. *Kinnear Rolling Doors, AIA 16-D-13 (Bulletin No. 46)*, 38-p. illus. handbook; complete specifications, installation data, and requirements for doors for industrial and commercial use. The Kinnear Manufacturing Co.

★ **4-68.** *The Meaning and Magic of Windows*, 16-p. illus. reprint by Dr. Matthew Luckiesh on the more efficient use of natural daylight in houses and other buildings through large window areas. Descriptive story, drawings. Libbey-Owens-Ford Glass Co.

4-64. *Standard Thermopane Sizes, AIA 26-A-1946*, Libbey-Owens-Ford Glass Co. Reviewed November.

4-67. *Steel Basement Windows (P&P 200)*, Machine and Tool Co. Reviewed November.

4-69. *Malta Frames (Cat. A-3)*, 24-p. illus. booklet on weatherproof wooden frames for windows and doors. Installation and operation details, descriptions of each type—dimensions, adaptability, list prices. Malta Manufacturing Co.

4-74. *LCN Door Closers, AIA File 27-B (Gen. Cat. 11)*, 36 pp., illus. 10 pages urging use of concealed door control devices, 25 discouraging use of exposed closers (which are the principal LCN product!) for "preserving architectural design from . . . 'defacement.'" Data, description of mechanism, ordering suggestions on closer types. Norton-Lasier Co.

4-70. *The Overhead Door with the Miracle Wedge*, 10-p. illus. booklet; detailed installation, construction specifications, and standard sizes and dimensions of doors for industrial, commercial, and garage use. The Overhead Door Corp.

4-71. *Canopy Doors for Private Plane Hangars (C-40-7500)*, 6-p. booklet giving standard sizes, specifications, and construction details for private plane hangars and hangar doors. Truscon Steel Co.

4-65. *Truscon Steel Windows and Industrial Doors, 1946 Ed.*, Truscon Steel Co. Reviewed November.

Electrical Equipment and Lighting

5-35. *Main and Range Service Equipment, AIA 31-D-3 (Bulletin 74)*, Frank Adam Electric Co. Reviewed November.

5-36. *Type AC Circuit Breakers, AIA 31-D-3 (Bulletin 75, replaces Bulletin 63)*, Frank Adam Electric Co. Reviewed November.

5-48. *Celanese Synthetics for the Electrical Industry*, 20-p. illus. booklet outlining Celanese synthetics; characteristics, mechanical and electrical properties. Index (includes applications), strength tables, technical data. Celanese Corporation of America.

5-41. *The Postwar Opportunities in Glass (Y-662)*, 14-p. illus. manual for the fixture manufacturer, suggesting use of glass in lighting in industrial, commercial, public, and institutional buildings, residences, highways, and streets. General Electric Co., Lamp Dept.

2 booklets on fluorescent and incandescent lighting fixtures and directional signs. Applications, overall dimensions, typical installation, and list prices. Also covers prismatic and aurora glass in fixtures. Kent Metal Manufacturing Co.:

5-42. *Architectural Kent Lighting (Bulletin 14).*

5-43. *Architectural Lighting.*

5-40. *Claude Banks Fluorescent, AIA 31-F (Supp. to Cat. 40)*, The Kirlin Co. (Lighting fixtures). Reviewed November.

Four folders (3½x6) explaining need for outlets in houses for adequate, safe

wiring in every room. From National Adequate Wiring Bureau:

5-44. *Spend Less Time in Your Kitchen and Laundry (M-2).*

5-45. *Modernizing Your Home? (M-3).*

5-46. *Beauty, Comfort, and Livability in Every Room (M-4).*

5-47. *Check Your Wiring (M-5).*

5-37. *Pittsburgh Permaflector Lighting, AIA 31-S-2 (Cat. 46),* Pittsburgh Reflector Co. Reviewed November.

5-38. *Radiant Lamps for Educational Institutions,* Radiant Lamp Corp. Reviewed November.

5-39. *Roebling Electrical Wires and Cables (J-883),* John A. Roebling's Sons Co. Reviewed November.

Finishers and Protectors

6-74. *Bondex Waterproof Cement Paint,* Brown Rogers Dixson Co. Reviewed November.

6-79. *Du Pont Color Conditioner for Industry,* 32-p. illus. booklet on use of color in industry to increase production and improve working conditions. Safety Color Code, color program layout for entire plant. E. I. Du Pont de Nemours & Co., Inc.

6-75. *Martin-Senour Color Packs,* The Martin-Senour Co. (Paint). Reviewed November.

6-76. *Maintenance and Sanitation Products for Hospitals,* Midland Laboratories. Reviewed November.

6-77. *Protexol Fireproofing (Circ. 110),* Protexol Corp. Reviewed November.

6-80. *Dewatex Lacquer #1, AIA 7-B-2,* 4-p. illus. folder on a waterproofing material for all types of walls, foundations, basements, etc. Applications, advantages, list prices. S & S Chemical Co.

6-78. *"Building Savers" Estimating Guide,* L. Sonneborn Sons, Inc. (Waterproofers, densifiers, etc.). Reviewed November.

Insulation (Thermal, Acoustic)

★ **9-54.** *Control of Industrial Heat and Power Losses,* 20-p. illus. manual for process engineers and power men. Nine examples of fuel saving by insulation of piping, flanges, drumheads, etc. "Heat Loss Estimate Sheet" supplement, tables for determining heat losses. Industrial Mineral Wool Institute.

9-55. *Gold Bond Acoustimetal, AIA 39-B-1,* 6-p. illus. booklet on a perforated metal acoustical system. Specifications, construction details, technical data, advantages. National Gypsum Co.

Load-Bearing Structure

12-89. *Boulevard Homes, Butler-Built of Aluminum,* 4-p. booklet on aluminum prefabricated houses. Floor plans and dimensions of house and garage; description of materials used for finishing. Specifications available. Butler Manufacturing Co.

12-90. *Claycraft Clay Products, AIA 3-F-2,* 6-p. illus. booklet briefly describing brick and tile products available. Uses, characteristics, colors, sizes, qualities. The Claycraft Co.

12-91. *Precision Granite Aggregates, AIA 8-B-3 (June 1944, No. 2),* 4-p. folder on physical and chemical attributes of granite aggregates. Charts on screen analysis, results of tests of Chelmsford granite aggregate. H. E. Fletcher Co.

12-87. *Indiana Limestone,* Indiana Limestone Institute. Reviewed November.

12-92. *Otiscoloy—High Tensile Steel,* 10-p. illus. booklet on Otiscoloy, a weldable, easily fabricated steel. Includes physical and workable properties, safe load charts, technical description, designing data, sizes, and limits. Jones & Laughlin Steel Corp.

★ 4 folders of drawings on structural arc welding. Full description of system, examples, dimensions, technical data. Lincoln Electric Co.:

12-93. *Arc Welded Jack Truss, AIA 13-C-2 (Plate 101, Cont'd from Plate 100).*

12-94. *Arc Welded Lateral Bracing, AIA 13-C-2 (Plate 102).*

12-95. *A Light Welded Queen Post Truss, AIA 13-C-2 (Plate 103).*

12-96. *A Light Welded Queen Post Truss, AIA 13-C-2 (Plate 104, Cont'd from Plate 103).*

12-88. *Dry-Brick Walls,* Louisville Cement Co. Reviewed November.

12-86. *The "Wilson System,"* Wm. M. Wilson. Reviewed November.

Miscellaneous Equipment

13-36. *New Water Repellent Fire Hose (AD-8002),* American-La-France-Foamite Corp. Reviewed November.

13-37. *Better Ovens,* G. S. Blodgett Co., Inc. Reviewed November.

13-43. *New Bruning 10-Inch Precision Slide Rule (A-1022),* illus. folder (3½x6¼); new plastic slide rule in both 5- and 10-inch size; also slip-lens slide rule magnifier usable with either size rule. Price lists, order blank. Charles Bruning Co., Inc.

13-44. *Croker "ABC" of Safety (Cat. 46),* 34-p. illus. catalog; fire-fighting equipment for buildings. Description, size, specifications. Croker Fire Prevention Corp.

13-38. *Leroy Lettering and Symbols (A 13-600006),* Keuffel & Esser Co. Reviewed November.

13-39. *The New Paragon Drafting Machine,* Keuffel & Esser Co. Reviewed November.

From Samuel Olson Mfg. Co., Inc. Reviewed November:

13-40. *Largest Private Hospital* (reprint).

13-41. *The Multi-Story Kitchen* (6-p. mimeo).

13-42. *The Subveyor* (booklet).

13-46. *School Sound Systems, AIA 31-I-7,* 30-p. illus. booklet on selection, installation, and utilization of school audio equipment. Advantages, layout of typical installation, specifications. Radio Manufacturers Association.

13-47. *Servel Gas Refrigerator, AIA 30-F-6,* 4-p. illus. folder on five types of gas refrigerators. Operation, cabinet construction, finish, and equipment; specifications, installation, and ordering data. Servel, Inc.

Non-Load-Bearing Structures

14-01. *Alloys (Cat. D-2),* Alloy Metal Wire Co., Inc. Reviewed November.

19-69. *Granux, Distinctive Building Facing,* Granux Corp. Reviewed November.

★ **14-09.** *Hollow Metal, AIA 16-A,* 69-p. illus. booklet on metal doors and frames, office partitions, metal furniture, elevator doors, etc. Index, detailed drawings of designs and equipment, construction details, specifications. Jamestown Metal Corp.

14-02. *How to Work With Kimpreg Plastic-Surfaced Plywood,* Kimberly-Clark Corp., Plastics Div. Reviewed November.

4-64. *Standard Thermopane Sizes, AIA 26-A-1946,* Libbey-Owens-Ford Glass Co. Reviewed November.

From Pittsburgh Corning Corp. Reviewed November:

14-04. *Insulation: Normal Heat Transmission Through Glass Block Panels, May 1941.*

14-05. *Light Transmission and Illumination, May 1941.*

14-06. *Solar Heat Transmission and Total Heat Gain, May 1941.*

14-07. *Sound Insulation, July 1942.*

14-08. *Weather Resistance Performance, July 1942.*

14-10. *Glass Blocks (G-5270),* 34-p. illus. booklet featuring examples of glass block construction in commercial and public buildings. Technical data, installation details, and layout tables for glass block panels. Pittsburgh Corning Corp.

14-03. *Plexiglas Sheets, Rods, and Molding Powders,* Rohm & Haas Co. Reviewed November.

Sanitary Equipment, Water Supply & Drainage

19-70. *Memco Sanitary Washing Equipment (Cat. 23-20),* 10-p. illus. folder on group wash-fountains with water-saving sprayheads, for industrial washrooms. Models, brief descriptions, specifications, rough-in of model. Metalloid Engineering & Mfg. Co.

19-65. *Wacor Sealed Air Chamber,* Wade Mfg. Co. (Water Hammer Arrestors). Reviewed November.

Surfacing Materials

19-71. *Altico Tile,* illus. folder (3x6) on aluminum tile and stainless steel tile for bathrooms, kitchens, business institutions. Waterproof, fire-repellent, lightweight. Said to be one-third cheaper than clay tiles. Altico, Inc.

From Armstrong Cork Co. Reviewed November:

19-66. *Ideas for the Modern Paint and Wallpaper Store.*

19-67. *Ideas for the Hardware Merchant Who Wants to Modernize His Store.*

19-68. *Magic Color for You,* Tylac Co. (Tile sheeting). Reviewed November.

Traffic Equipment

20-31. *Motorstair (Bulletin 1),* Multiscope, Inc. Reviewed November.

20-32. *Materials Handling Conveyors,* 10-p. illus. pamphlet on conveyor systems for industrial plants. Types, construction details, subveyor models, detailed drawings. Samuel Olson Mfg. Co., Inc.

STEEL JOISTS: III

STANDARD SPECIFICATIONS FOR CONSTRUCTION

This is the third and concluding sheet of a series on steel joists and their use in construction. Sheet I (Serial No. 25, October 1946) described the product, its manufacture and use, and included safe load tables. Sheet II (Serial No. 26, November 1946) contained the first portion of the "Standard Specifications for Construction." This Sheet III contains the remainder of the "specifications."

These "specifications" are essentially those adopted by the Steel Joist Institute, Washington, D. C., effective 1 February 1929, and revised 12 December 1933; 23 April 1941; and 30 April 1946. The following paragraphs differ only in format and details of grammar from the latest revision. Section and paragraph designations are identical with the original, which was compiled by Frank Burton, Consulting Engineer. These "specifications" may be adopted by reference in preparing streamlined job specifications.

107. ERECTION: (a) Ends of steel joists shall extend at least four in. (4") on masonry or reinforced concrete supports and at least two and one-half in. (2½") on steel supports. Every third steel joist on concrete or masonry supports shall be anchored thereto with an anchor equivalent to a three-eighths in. (⅜") round bar. Ends of all steel joists supported on masonry walls shall be bedded in mortar.

(b) Steel joists supported on steel beams shall be secured thereto with anchors made of not less than three-sixteenths in. (3/16") round bars fastened over flanges of supporting beams, except in buildings having a height of more than twice the least dimension of the base, in which case each steel joist shall be welded to supporting steel with two (2) welds at each end, each one in. (1") long, or by means of a one-half in. (½") bolt or rivet at each end. In buildings having a height of more than two and one-half times the width of the base, the structural frame and floors must be depended upon to distribute the wind load horizontally. At supports where steel joists are anchored with a hook anchor only, and in buildings having a height of more than two (2) times their width, top lath or other centering shall be cut and formed to permit concrete of top slab to fill space around ends of steel joists.

(c) Steel joists shall be fastened in place and permanent bridging installed before any construction loads (except weight of workmen necessary to install bridging) are placed upon the joists.

(d) During construction, care shall be exercised to prevent excessive concentrated or moving loads. The construction contractor shall provide for adequate distribution of such loads so that the carrying capacity of any steel joist is not exceeded during that period.

108. BRIDGING: (a) As soon as steel joists have been erected, and before the application of construction loads, bridging shall be installed. This bridging shall be adequate safely to support the top chords or flanges against lateral movement during construction, and shall hold the steel joists in an approximately vertical plane. Steel joists at the ends of panels shall be braced laterally by anchors or ties at each line of bridging. If diagonal bridging is used, in which all diagonal members will resist only tension, such members shall be not less than three-sixteenths in. (3/16") round rods, and these diagonals shall be supplemented by a continuous strut adequately attached to the top chords or flanges of all steel joists so bridged. This top strut shall be equivalent as a strut to a one-half in. (½") round steel bar. If diagonal members are capable of resisting both tension and compression, top strut may be omitted. If bridging consists of horizontal beam or angle sections it must be so connected to the joists that it will support the top chords or flanges against lateral movement and hold the steel joists approximately vertical. Fourteen ga (14) wire diagonals shall be used to secure bottom chords or flanges at each line of bridging of this type. Wire may be omitted when bridging restrains both top and bottom chords or flanges.

(b) Number of lines of bridging provided shall be not less than:

SPAN	NUMBER OF LINES OF BRIDGING
up to 14 ft	— one row near center
14 to 21 ft	— two rows approximately ¼ span apart and symmetrical about center of span
21 to 32 ft	— three rows approximately at ¼ points of span

(c) In the case of nailer steel joists carrying a wood deck, the wood deck may be used as the top member of the bridging system.

Progressive Architecture • December 1946 • BUILDING PRODUCTS FACTS Serial No. 27

109. FLOOR & CEILING PROTECTION OF STEEL JOIST CONSTRUCTION: (a) Non-fire-resistive Construction—When used in any structure where wood joists are permitted, steel nailer joists may be used and wood floor may be used over such steel joists.

(b) Fire-resistive Construction—Wherever fire-resistive construction is required, steel joists may be used if protected as follows:

(1) One-Hour Fire Resistance*

Floor: 2" reinforced concrete, 2" reinforced gypsum, or 2" precast gypsum tile.

Ceiling: ¾" Portland cement and sand plaster 1:2 for scratch coat and 1:3 for brown coat with 15 lb hydrated lime and 3 lb short asbestos fiber per bag of Portland cement, or ¾" sanded gypsum plaster 1:2 for scratch coat and 1:3 for brown coat.

(2) One-and-One-Half-Hour Fire Resistance*

Floor: 2" reinforced concrete, 2" reinforced gypsum, or 2" precast gypsum tile.

Ceiling: ¾" Portland cement and sand plaster 1:2 for scratch coat and 1:3 for brown coat with 15 lb hydrated lime and 3 lb short asbestos fiber per bag of Portland cement, or ¾" sanded gypsum plaster 1:2 for scratch coat and 1:3 for brown coat.

(3) Two-Hour Fire Resistance*

Floor: 2¼" reinforced concrete, 2" reinforced gypsum, or 2" precast gypsum tile, the latter with ¼" mortar finish.

Ceiling: ¾" sanded gypsum plaster 1:2 for scratch coat and 1:3 for brown coat.

(4) Two-and-One-Half-Hour Fire Resistance*

Floor: 2" reinforced concrete, 2" reinforced gypsum, or 2" precast gypsum tile, the latter with ¼" finish.

Ceiling: 1" neat gypsum plaster or ¾" gypsum-vermiculite plaster, ratio of weight of gypsum to fine heat-expanded vermiculite 2:1 to 3:1.

or

Floor: 2½" reinforced concrete.

Ceiling: ⅞" sanded gypsum plaster 1:2 for scratch coat and brown coat.

(5) Three-Hour Fire Resistance*

Floor: 2½" reinforced concrete, 2" reinforced gypsum, or 2" precast gypsum tile, the latter with ½" mortar finish.

Ceiling: 1" neat gypsum plaster or ¾" gypsum-vermiculite plaster, ratio of weight of gypsum to fine heat-expanded vermiculite 2:1 to 3:1.

(6) Four-Hour Fire Resistance*

Floor: 2½" reinforced concrete, or 2" reinforced gypsum slabs, the latter with ½" mortar finish.

Ceiling: 1" gypsum-vermiculite plaster applied on metal lath; 2:1 to 3:1 of gypsum to heat-expanded vermiculite by weight.

* Ceiling plaster shall be applied on metal lath of appropriate weight for spacing of supports, or other plaster bases as may be approved by the Steel Joist Institute. Lath shall be tied to supports to give equivalent of single 18 ga steel wire ties at 5" centers. Thickness of plaster shall be depth from back side of flat lath, and to back of flat portion of ribbed lath. Slab thicknesses are measured from top flange of joists and unless otherwise indicated are for monolithic poured construction. Precast slabs shall have joints grouted. Wood nailers may be placed in top slabs provided they are separated from the top of the steel joists by the following minimum thickness of concrete or gypsum:

1½ Hr Fire-Resistive Construction—1"
2 Hr Fire-Resistive Construction—1⅝"
2½ Hr Fire-Resistive Construction—1⅝"
3 Hr Fire-Resistive Construction—1⅝"
4 Hr Fire-Resistive Construction—1⅝"

110. DECKS AND TOP SLABS: (a) Decks or top slabs over steel joists may be of concrete or gypsum poured on metal lath centering attached to top chords or flanges of steel joists as required elsewhere in this section, or on removable centering, provided top chords or flanges of steel joists are properly stayed by the slab. Other equally suitable permanent centering may be used, provided it is substantially attached to top chords or flanges as required elsewhere in this section and provided these attachments (or the centering itself) are securely anchored into the slab. Precast concrete or precast gypsum slabs when securely attached to the top chords or flanges and anchored thereto and brought to a firm bearing, wood decks as specified in these specifications, and corrugated or other steel roof decks securely anchored to the top chords or flanges, may be used over steel joists. Any attachment or pair of attachments when applied shall be capable of staying the top chord flange laterally in both directions, and in the case of open-web steel joists, shall be spaced not farther apart than the panel point spacing. Decks or top slabs over steel joists shall not be assumed to carry any part of the compression stress in the steel joist.

(b) Flat wood decks of single thickness of seven-eighths in. (⅞") material shall not have a span of more than twenty in. (20") for floors, or thirty in. (30") for roofs. Such decks shall be securely fastened to nailer strips.

(c) Poured structural slabs of concrete, gypsum, or other similar material shall not be less than two in. (2") thick. They shall be poured upon three-eighths in. (⅜") ribbed metal lath weighing not less than four (4) lb/sq yd for spans not exceeding 24 in. and upon three-quarter in. (¾") rib lath weighing not less than .60 lb/sq ft for spans not exceeding 30 in. Other material equally suitable as a form or centering for casting concrete or gypsum slabs may be used in place of rib lath. Rib lath or other centering which remains in place shall be substantially attached to the top chord or flange of each steel joist at intervals of not over eight in. (8"). Such slabs shall be reinforced with mesh or rods, equivalent to ¼" rounds at 12" cc placed both perpendicular and parallel to run of joists, in addition to the rib lath, except that when slabs are to be covered with a wood strip top floor, the rib lath or centering may, if adequate, serve also as the reinforcement.

(d) Any material used as centering for top slab shall be installed so as not to exert undue lateral pull on top chords or flanges of steel joists or parallel steel or masonry structural members.

111. DEFLECTION: Deflection of the finished floor due to the designed live load shall not exceed one-three-hundred-sixtieth (1/360) of the span.

112. FACTOR OF SAFETY AND TESTS: Steel joist construction, if required to be tested, shall have bridging and top deck applied as used and test load shall be uniformly distributed. Steel joist construction shall sustain for 12 hours a total uniform load equal to dead load plus two times the design live load. After test load is removed, permanent deflection shall not exceed twenty percent (20%) of deflection under total test load.

113. ROOF DECKS: Where roof decks are used, steel joists may be spaced in excess of limitations prescribed in Section 100 (b) of these specifications. However, where such wider spacings are used, the construction shall not be considered as "steel joist construction" as defined in these specifications, but shall be designed and constructed in accordance with recognized engineering practice to support safely all loads without exceeding unit stresses specified in these specifications.

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REVIEWS

T-SQUARE AND CADUCEUS

Hospital Planning. Charles Butler and Addison Erdman. F. W. Dodge Corp., 119 W. 40 St., New York, N. Y., 1945. 236 pp., illus. $15.00

The design of a contemporary hospital is one of the most complex architectural problems. It must integrate the latest theories of medicine with advancing sociological concepts. The great medical discoveries of the last decades and the improvements in diagnostic and therapeutic methods accentuate the everchanging needs of the modern hospital. Although these developments cannot be foreseen by the designer, they can be anticipated. And, from the social point of view, a more human approach is necessary. Above all the patient should be respected, and his stay in the hospital made an educative and not a degrading experience. This is mainly the work of the medical and nursing staff but may be encouraged by proper architectural consideration.

In view of the number of hospital projects in drafting rooms, the recently published book, *Hospital Planning*, will certainly meet with success. The authors, by their long experience in the field, are well equipped for their enormous task. The limited size of the book did not permit discussion of all the ramifications of hospital planning, but unfortunately too much emphasis is too often placed on secondary details at the expense of basic considerations. For example, in the chapter on nursing units it would have been useful to discuss the optimum bed capacity instead of the relative merits of competitive hardware. Furthermore, there is no mention of the recent development of decentralized versus centralized nurseries, nor of independent septic delivery facilities, nor many other important matters. On the contrary, the authors speak about separate delivery rooms for private, semi-private, and ward patients, which is certainly an expensive triplication that even the richest institution could not afford without lowering its standards. Every hospital presents the architect with a new set of conditions which must be resolved if satisfactory results are desired. In order to develop a well integrated plan it is necessary to know the manner in which each department or service operates. This can only be done if there is an intimate knowledge of the *functioning* of the department. In general, the authors do not give this information, except possibly in the chapters on communicable diseases and tuberculosis hospitals. Rather, they seem to be describing existing plans which may or may not be applicable under new sets of conditions, and consequently may be extremely confusing, especially to the inexperienced designer. For instance, because of their approach, the relationship between the outpatient department and the hospital which provides clinics on all floors contiguous to the related wards is excluded, despite the fact that this solution was successfully applied in the Los Angeles County General Hospital and in others.

Many of the illustrations are outmoded. The book would have been improved by showing more plans like the typical ward floor of Goldwater Memorial Hospital, for instance, where the plan is so clear, legible, and quickly understood. There are many illustrations with good and valuable details, but quite a few with little or no interest. The authors agree that, with air conditioning and using only artificial light, the operating room may be an inside room. It would have been interesting, even if the authors disagree with the solution, to show a plan where the designer has taken full advantage of these conditions, as, for instance, in the operating suite of the Surgical Pavilion of Suez, Egypt, designed by Paul Nelson (*Architectural Record*, June 1937). Some illustrations of this kind would have given more comprehensive information on hospital design.

In spite of its shortcomings, this book can be useful, for it is the result of serious studies, even though incomplete. It is only regrettable that from the medical as well as from the social point of view it points to the past instead of to the future.

TIBOR FREESZ

(Continued on page 96)

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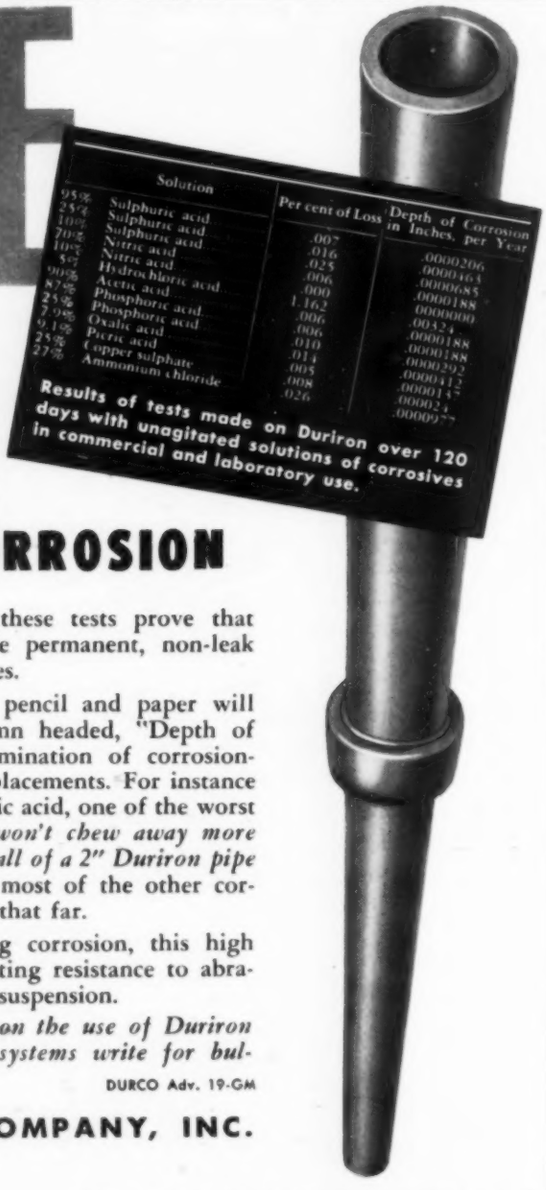

Solution	Per cent of Loss	Depth of Corrosion in Inches, per Year
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10% Sulphuric acid	.025	.0000685
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10% Nitric acid	.000	.0000000
5% Nitric acid	1.162	.003324
90% Hydrochloric acid	.006	.0000188
37% Acetic acid	.010	.0000188
25% Phosphoric acid	.014	.0000292
77.9% Phosphoric acid	.005	.0000412
9.1% Oxalic acid	.008	.0000137
25% Picric acid	.026	.0000234
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Ammonium chloride		

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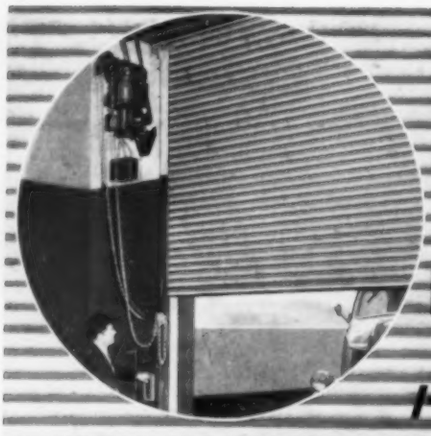

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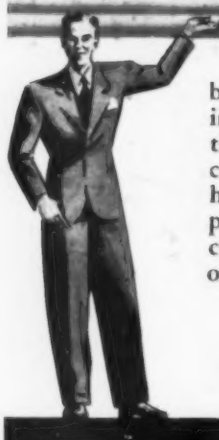

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REVIEWS

(Continued from page 94)

ONE CAN BE TRUSTED

Opportunities in Architecture. William Thorpe. Vocational Guidance Manuals, Inc., 45 West 45th St., New York, 1946. 92 pp. $1.25

Architecture: A Profession and a Career. The American Institute of Architects, The Octagon, Washington, D. C., 1945. 57 pp.

The booklet, *Opportunities in Architecture*, fails to show a convincing familiarity with current architectural knowledge and practices and is colored by a narrowly individualistic outlook on things architectural. Added to these basic shortcomings, its misstatements of fact, fanciful architectural criticism, and naive comments make it undependable as a source of information on the architectural profession. Readers unfamiliar with the subject will form some strange impressions from this booklet.

On the other hand, *Architecture: A Profession and a Career* is warmly recommended to readers who are looking for an accurate summary of the architectural profession. This valuable booklet published by the American Institute of Architects together with several architectural agencies affords interesting, dependable, reasonably complete information. The various subjects discussed range from architectural history and philosophy to opportunities in the profession. The individual chapters are written by architects prominent in the Institute and make up a well-balanced view of architectural affairs in this country.

LAWRENCE E. MAWN

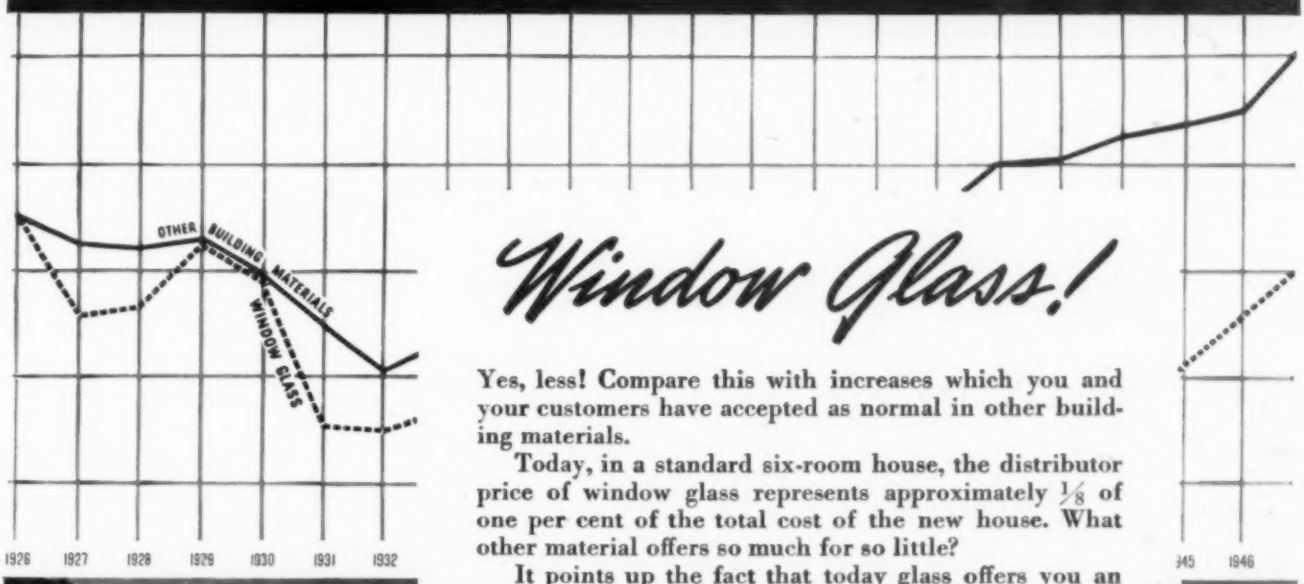
GENUS: HOMELIKE

Institutional Homes for Children. Appleton P. Clark, Jr. William Helburn, Inc., 15 E. 55 St., New York, N. Y., 1945. 128 pp., illus. $7.50

Sufficient to convince anyone that a worthwhile American institutional home for children is yet to be built, Mr. Clark's selections illustrate, too, the grim atmosphere (genus:homelike) produced by duplicating the worst home designs, circa 1928. Too often, what the text calls homelike implies a long line of honorable ancestors for the writer—barons and Italian bankers, inhabitants of Tudor castles and Renaissance fortresses. The "cottages" shown are sometimes spacious enough to overwhelm even Louis XIV. Perhaps the intention of the architects was to "lift the sights" of the children. One lone plan, of an institution in Houston, Texas, by architects Stayton Nunn and Milton McGinthy, indicates a consideration for orientation and tired young legs. We hope for a long wait before the next edition of this book; some old faces may then have gone, replaced by worthwhile new ones, of course. Poor kids!

DAVIDSON-SMULL

What Building Material Now Costs Less Than In 1926?



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Architect, Paul Thiry

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COMMERCIAL

Office Buildings

Administration Building, Los Angeles, Calif.—THEODORE CRILEY, JR., ARCHITECT. A 2-story window accentuates the entrance and relieves this administration building for a radio manufacturer of a factory appearance. Photos, floor plans. (Oct. The Architectural Forum, p. 100)

Office Building, San Francisco, Calif.—WURSTER, BERNARDI & EMMONS, ARCHITECTS. Plant and general offices were consolidated in this striking building, providing a recreational area on the top floor consisting of dining room, kitchen, and a partially roofed sun deck enclosed with a glass windscreen. Photos, floor plans. (Oct. The Architectural Forum, p. 104)

Shops

Women's Specialty Shop, Hollywood, Calif.—GRUEN & KRUMMECK, ARCHITECTS. To outshine its neighbors on a street of brightly lit shops, this shop has a continuous sign background consisting of single strip neon tubes on 4-in. centers which extend down the narrow 1-story front and along the arcade ceiling to the far edge of the show windows. Photos, floor plans. (Oct. The Architectural Forum, p. 133)

Tailor Shop, New York City—EUGENE BACK, THEODORE YONKLER, DESIGNERS. The interior of this shop doubles as the show window. Photos, floor plans. (Oct. The Architectural Forum, p. 134)

Specialty Shop, Boston, Mass.—CARSON & LUNDIN; HARRY E. DAVIDSON & SON, ARCHITECTS. A 2-story glass front set askew reveals an attractive interior, replaces the show window. Photos. (Oct. The Architectural Forum, p. 137)

Shoe Salon, New York City—KETCHUM, GINA & SHARP, ARCHITECTS. The possibilities of the open front are exploited to the fullest in this design. Photos, isometrics. (Oct. The Architectural Forum, p. 138)

Women's Apparel Shop, Kansas City, Mo.—ROSS-FRANKEL, INC., DESIGNERS. A 4-story architectural trade mark, with backing of large squares of porcelain-enameled sheet metal, is the interesting point in this design. Photos, floor plans (Oct. The Architectural Forum, p. 140)

Auto Sales and Repair Shop, N. Hollywood, Calif.—RICHARD J. NEUTRA, ARCHITECT. On a corner lot, the front and side of the showroom were completely enclosed with glass to make the most of the visibility of the site. Photos, plot and floor plans. (Oct. The Architectural Forum, p. 141)

Remodeled Shop, Berkeley, Calif.—JOHN CARL WARNECKE, ARCHITECT. A sheer glass front from sidewalk to ceiling makes this camera shop's whole interior a showcase. Photos, floor plans. (Oct. The Architectural Forum, p. 146)

Showrooms

Cutlery Showroom, New York City—SIMON B. ZELNIK, ARCHITECT. A simple and precise background for wholesale selling. Photos, floor plans. (Oct. The Architectural Forum, p. 135)

Showroom, New York City—JOSEPH ARONSON, DESIGNER. Variation of ceiling levels helps achieve effective lighting in this showroom serving both the public and buyers. Photos, floor plans. (Oct. The Architectural Forum, p. 142)

Plastic Center, New York City—HERMAN H. SIEGEL & SEYMOUR JOSEPH, ARCHITECTS. This showroom for plastic paints relies on its unusual design and color styling to attract customers. Photos, floor plans. (Oct. The Architectural Forum, p. 143)

EDUCATION

Gymnasiums

Gymnasiums and Playrooms. A survey of the purposes of gymnasiums and playrooms and the types of space most suitable for them, including articles on their functions and use; indoor play space for the elementary school; gym facilities for all twelve grades; the combined gym-auditorium; and gym facilities for large secondary schools. Photos, renderings, plot and floor plans. (Aug. The School Executive, p. 43)

ENTERTAINMENT

Radio Studios

Transmitter Building, Radio Station CHUM, North York Township, Ontario—EARLE C. MORGAN, ARCHITECT. Due to its location outside a city, the plan of this building provides living quarters as well as accommodation of space for equipment, and is residential in style. Photos, floor plans. (Oct. Journal of the R.A.I.C., p. 259)

Experimental Studio, New York City—FELLHEIMER & WAGNER, ARCHITECTS. To vary acoustics effectively and quickly, the engineer, Clarence R. Jacobs, instituted a system of movable vanes behind which, within the walls, are absorptive materials in various thicknesses; manipulated by the touch of a button. Photos, diagram. (Oct. The Architectural Forum, p. 92)

(Continued on page 100)

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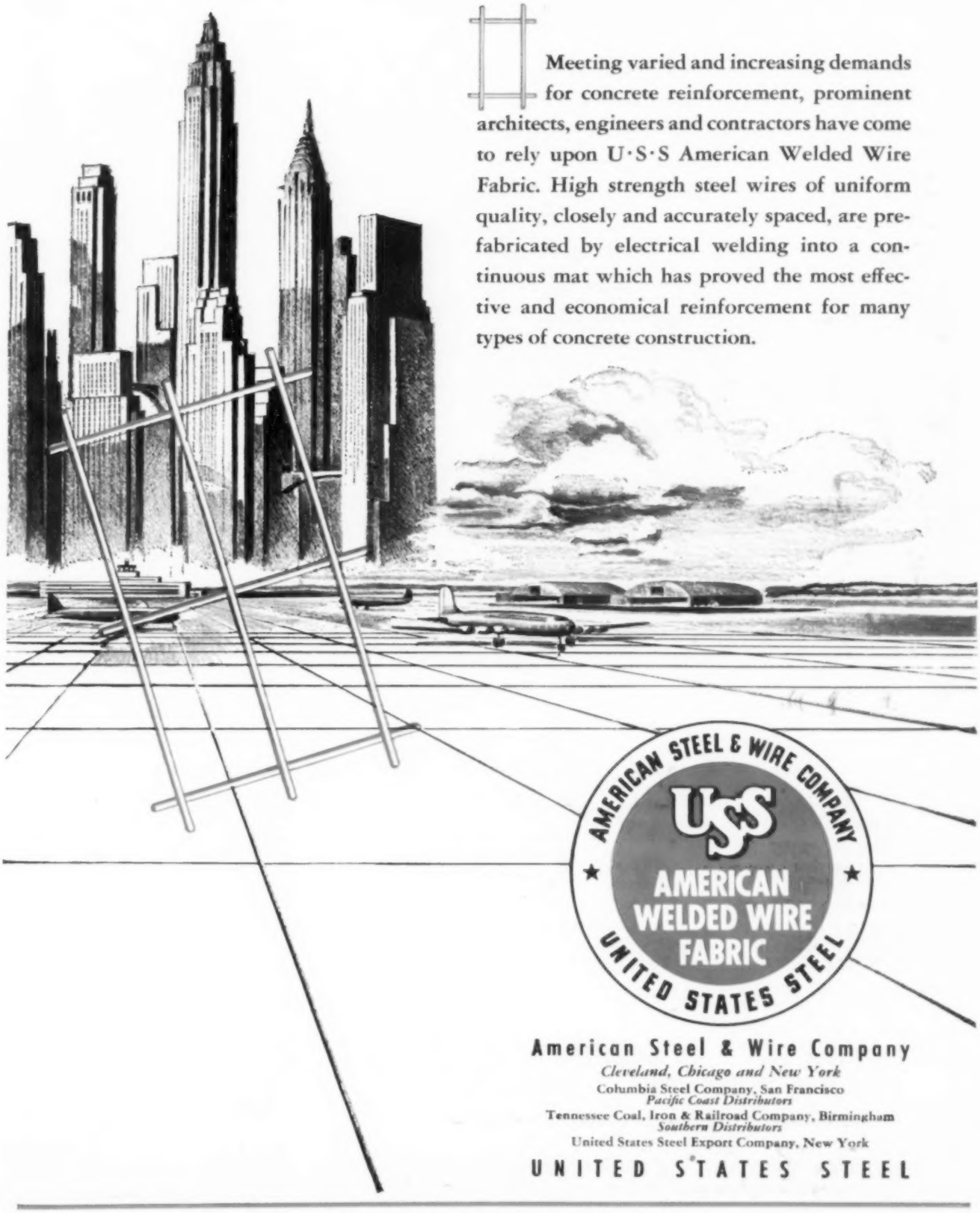

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GUIDE

(Continued from page 98)

HEALTH

Clinics

Clinic, Seattle, Wash.—NARAMORE, BAIN, BRADY & JOHANSON, ARCHITECTS. This building, on a steeply sloping lot, accommodates ten doctors in five suites. Photos, floor plans. (Oct. The Architectural Forum, p. 129)

Hospitals

General Hospital, Houston, Tex.—ALFRED C. FINN, ARCHITECT. The Navy's largest permanent hospital, this project contains 37 buildings done in "conservative contemporary" style. Photos, plot and floor plans. (Oct. The Architectural Forum, p. 130)

"Reconstruction" Now in Progress, Queen Victoria Hospital, East Grinstead, Sussex, England—F. GORDON TROUP, ARCHITECT. A plastic surgery wing added to this country hospital under duress of war, divided into 3 fairly sharply defined parts: the planning division, presurgical, and surgical sections; described as the most modern specialized center in the United Kingdom. Photo, elevations, floor plans. (Oct. The Modern Hospital, p. 48)

HOUSING

Hotels

Airport Hotels — FRED BASSETTI, DESIGNER. Three schemes, small, medium, and large, for hotels to be placed as near as possible to airport terminal buildings, significant for the progressive attitude of the designer and sponsor-promoter in seeing and planning ahead for this new building type. Renderings, sketches, floor plans. (Oct. Progressive Architecture, p. 75)

Housing Projects

Housing Estate, Finsbury, England—TECTON, DESIGNERS. A scheme of 129 flats in 3 separate blocks, all apartments designed to have the living rooms, kitchens, and balconies along one elevation and all bedrooms facing the opposite way; a reinforced concrete box-frame construction of continuous walls and floors without columns or beams. Model photos, isometrics, sections, plot and floor plans. (The Architects' Journal for Sep. 12, p. 191)

40 Houses of Contemporary Design, Roslyn, Long Island, N. Y.—CY WILLIAMS, DESIGNER-BUILDER. Homes designed for veterans, built under federal price ceilings, 1-floor, 3-bedroom, modified ranch style in plan. Photos, plot and floor plans. (Oct. The Architectural Forum, p. 112)

Residences

For a Hill on San Francisco Bay, Piedmont, Calif. — MICHAEL GOODMAN, ARCHITECT. A lot, restricted in size and sloping steeply up from the sidewalk, provided the design problems for this 2-level modern house. Photos, plot and floor plans. (Oct. Architectural Record, p. 84)

2-Level Scheme for a View, Orinda, Calif. —MICHAEL GOODMAN, ARCHITECT. A dropped living room is used here to capitalize on a downward view, while also making the dining space virtually a gallery from which to enjoy the view through the living room windows. Photos, cross section, plot and floor plans. (Oct. Architectural Record, p. 88)

Chatelaine House No. 3—RICHARD A. FISHER, ARCHITECT. Glass window-walls, solar and radiant heating, and what the architect has termed the "Big Room" for informal living, are the main features of this small and compact design for a 40-foot-wide lot. Model photos, floor plans. (Sep. Canadian Homes and Gardens, p. 84)

Chatelaine House No. 4—C. B. K. VAN NORMAN, ARCHITECT. A case study house for an average Canadian family of four or five, done along simple ranch house lines, 1-floor, basementless. Model photos, plot and floor plans. (Oct. Canadian Homes and Gardens, p. 106)

(Continued on page 102)

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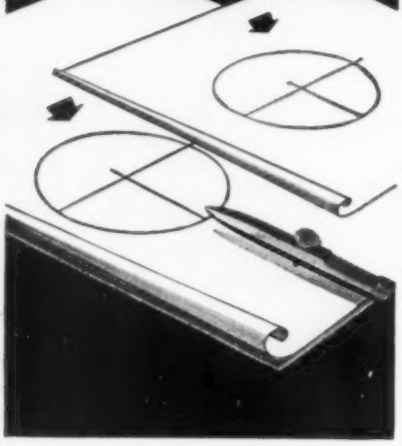

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GUIDE

(Continued from page 100)

Home by the Sea, Vancouver, B. C.—H. L. HUTTON, DESIGNER. A modern and efficient 2-story house on a 225-foot sea frontage, boasting an entire double-glass north wall overlooking the sea. Photos, floor plans. (Sep. Canadian Homes and Gardens. p. 24)

Design for G.I.'s—ANTONIN RAYMOND & LADISLAV L. RADO, ARCHITECTS. A modern, 1-floor house designed to be built now of economical local lumber and stone, with a compact, footstep-saving plan. Model photo, floor plans. (Sep. Ladies' Home Journal, p. 214)

"Brookhouse," Near Princeton, N. J.—KENNETH KASSLER, ARCHITECT. An imaginative little house designed as a study or retreat a short distance from the owner's home, overlooking an ice pond to which the whole design is oriented. Photos, plot plan. (Sep. Progressive Architecture, p. 75)

3 New Houses at Snake Hill, Belmont, Mass.—CARL KOCH, HUSON JACKSON, ROBERT KENNEDY, ARCHITECTS. An addition to the well known development of contemporary houses outside of Boston, these new houses use an economical construction system wherein standardized parts are assembled on a modular basis; this provides for the broadest choice in individual preference as to room layout, while the general similarity of exterior appearance tends to produce a homogeneous neighborhood. Photos, isometrics, plot and floor plans. (Oct. Progressive Architecture, p. 52)

House at Bloomfield Hills, Mich.—FRANK LLOYD WRIGHT, ARCHITECT. Built on a very uneven piece of land, this house and its site are part of each other; designed for a family who wanted "a house with a lot of windows, a large fireplace, a carport instead of a garage, room enough for three people to live in but large enough for six to sleep in." Photos, floor plans. (Oct. Progressive Architecture, p. 67)

House at Modesto, Calif. — WURSTER, BERNARDI & EMMONS, ARCHITECTS. A distinctive house planned for a hot, dry climate; all windows exposed to direct sunlight are large, double-hung sash equipped with operable shutters, a flexible means for controling light and ventilation. Photos, floor plans. (Oct. Progressive Architecture, p. 71)

Drama in Glass, Berkeley, Calif.—WILLIAM W. WURSTER, ARCHITECT. To facilitate access to the garden in this poorly planned old house, the architect designed on the outside wall a spiral staircase enclosed in an interesting glass cage. Photos, floor plans. (Sep. The American Home, p. 46)

Good Living, Inside and Out, Tucson, Ariz.—ARTHUR T. BROWN, RICHARD A. MORSE, ARCHITECTS. A small, flexible house built along simple lines, with good use of space in planning. Photos, floor plans. (Sep. The American Home, p. 64)

2 Families Knew What They Wanted: Stanford, Conn.—EDITH BARGER, DESIGNER; **Burlington, Vt.**—FREEMAN-FRENCH-FREEMAN, ARCHITECTS. Two 2-floor New England houses, the first modern in approach, the second traditional, both stressing rugged simplicity. Photos, floor plans. (Oct. The American Home, p. 56)

This House Had All the Answers, Van Nuys, Calif.—ALFRED YBARRA, DESIGNER. A small, interesting board and batten hillside house, 2-story, modern, with an open plan for active living. Photos, floor plans. (Oct. The American Home, p. 58)

They Tried Modern . . . and Like It, New London, Conn.—RAYMOND VINER HALL, ARCHITECT. A modern, hillside, 2-story house with bedrooms on the lower level. Photos, floor plans. (Oct. The American Home, p. 60)

House in Texas—CANDILL & ROWLETT, ARCHITECTS. Only 650 ft. of floor area are actually enclosed in this small, low-priced house, with an open plan and only one interior door helping to cut the costs and improve circulation as well. Photos, perspective, floor plans. (Oct. The Architectural Forum, p. 109)

House in Seattle, Wash.—CHARLES A. LAWRENCE, ARCHITECT. A split-level, 2-building house, the main quarters in the lower house; laundry, studio, and garage

(Continued on page 104)

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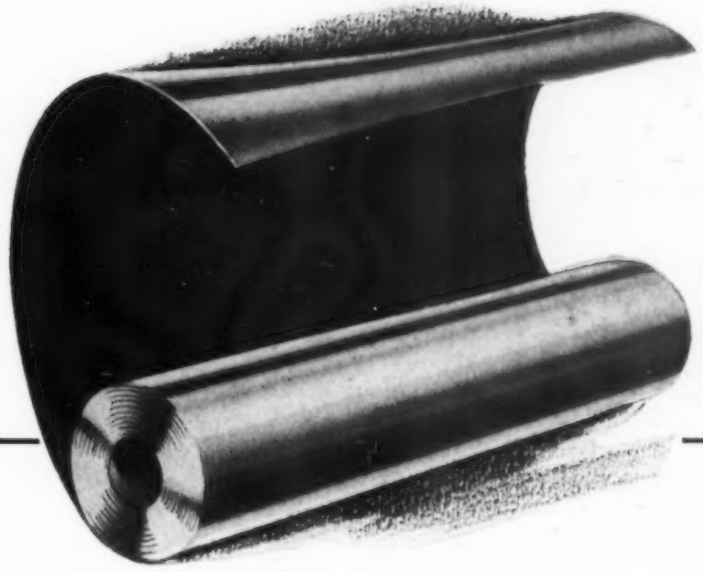

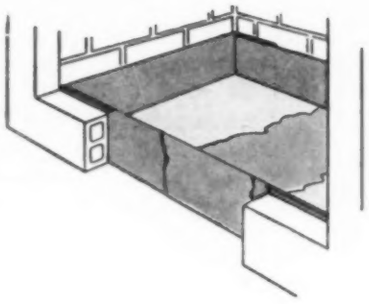

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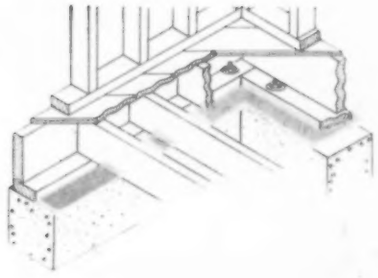

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GUIDE

(Continued from page 102)

in a 3-story building nestled against a steep bank. Photos, plot and floor plans. (Oct. The Architectural Forum, p. 110)

Tri-Level House, Long Beach, N. Y.—GEORGE NEMENY, ARCHITECT. The third level in this house, one of a group of speculative houses, contains garage and utility room; simplicity of detail and reliance upon functional elements for decorative effect are outstanding features of the design. Photos, isometric drawing. (Oct. The Architectural Forum, p. 117)

Veteran's House, Tucson, Ariz.—ARTHUR T. BROWN, ARCHITECT. An economical and livable 4-room unit. Photos, plot and floor plans. (Oct. The Architectural Forum, p. 119)

Six-Room Bungalow, Marion, Ill.—LESTER C. HAECKEL, ARCHITECT. House built low on an H-shaped plan with open car shed. Photo, plot and floor plans. (Oct. The Architectural Forum, p. 119)

Veteran's House, Portland, Ore. — VAN EVERA BAILEY, ARCHITECT. An all wood house, built this year for $7650, with handy layout; heated by electric coils embedded in ceiling plaster. Photos, floor plans. (Oct. The Architectural Forum, p. 122)

House in Pasadena, Calif.—WHITNEY R. SMITH, ARCHITECT. 1-story basementless house of 1300 sq. ft. for $7000, with uncomplicated shed roof cutting costs and providing spaciousness in spite of minimum footage. Photos, plot and floor plans. (Oct. The Architectural Forum, p. 124)

The New Houses (No. 11): The Cranwell House — CRANWELL CONSTRUCTION CO., LTD. A steel frame construction, the external cladding of hollow tiles distinguishes this system. Photos, isometrics, floor plans. (Sep. The National House Builder and Building Digest, p. 19)

Australia's First Steel House—H. EISNER, DESIGNER. A prefabricated steel house completed in the factory with all internal and external finishings, made ready for erection in two or more sections; boasts an insulation system in which the roof is insulated the same way as the walls, but to about double the thickness, eliminating the pocket between roof and ceiling which retains heat. Photos. (Oct. The National House Builder and Building Digest, p. 23)

INDUSTRIAL

Factories

Factory, Tiffin, Ohio—THE AUSTIN CO., ENGINEERS. This factory for small electric motors enjoys controled conditions, to obtain the maximum benefits of straight-line mass production techniques and to control quality through dust elimination. Photos. (Oct. The Architectural Forum, p. 101)

Foundries

Foundry Building, Brantford, Ontario—ALLWARD AND GOUINLOCK, ARCHITECTS. Photos. (Oct. Journal of the R.A.I.C., p. 250)

Laboratories

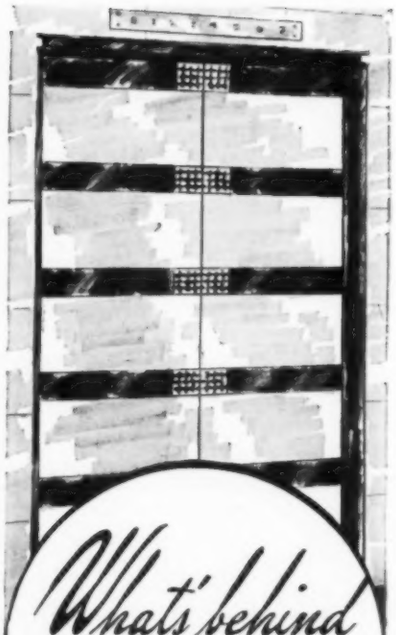
Railroad Laboratory, Chicago, Ill. — DE LEUW & CATHER, ARCHITECTS. Testing laboratory, emphasizing adequate lighting, with continuous lines of glass block panels around the building, and employing interior colors for safety devices as well as for comfort. Photos. (Oct. The Architectural Forum, p. 101)

Plants

New Plant, Tracy, Calif. — SKIDMORE, OWINGS & MERRILL, ARCHITECTS. Designed for straight-line production, this baby-food plant has a cubage of 5½-million feet, is of earthquake-resistant construction. Photos. (Oct. The Architectural Forum, p. 99)

Starch Plant, Clewiston, Fla.—RUST ENGINEERING CO., ENGINEERS. Curved corners and glass block curtain walls distinguish this plant housing the dangerous operation of converting sweet potatoes into starch. Photos, cross section. (Oct. The Architectural Forum, p. 103)

(Continued on page 106)



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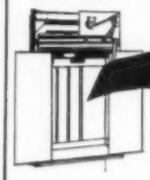

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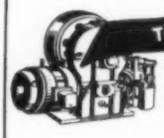

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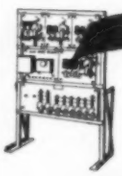

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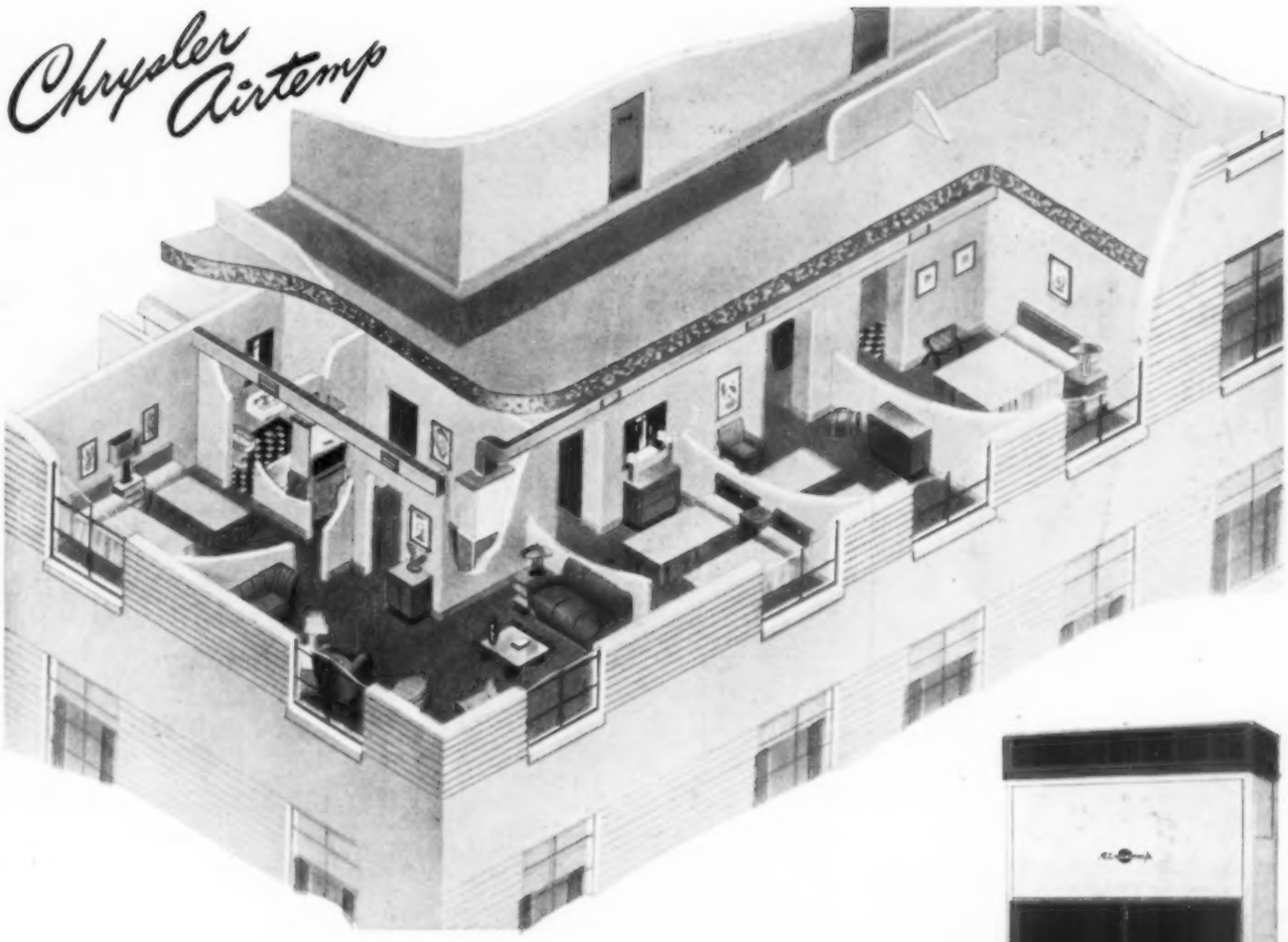

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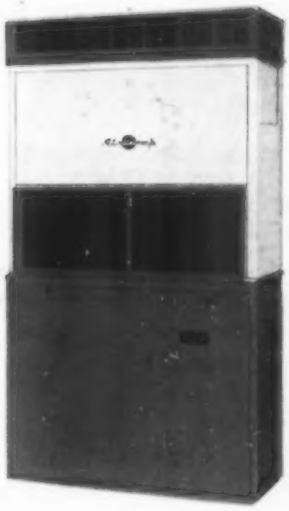

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GUIDE

(Continued from page 104)

Small Appliance Plant, Barrie, Ontario—BECK AND EADIE, ARCHITECTS. Photos, floor plans. (Oct. Journal of the R.A.I.C., p. 254)

Warehouses

Warehouse Offices, Detroit, Mich.—EMMERLING, SPELLICY & HARTMAN, ARCHITECTS. This office wing has a dead level roof covered with a 2-in. film of water from the air conditioning compressor during the summer, reducing the cooling load and lowering the roof surface temperatures considerably. Photos. (Oct. The Architectural Forum, p. 102)

INTERIORS

Dressing Alcove in Master Bedroom—McSTAY JACKSON CO., DESIGNERS. Sliding opaque glass doors suspended from track hangers set off an end of a bedroom for dressing space. Photo, selected details. (Sep. Progressive Architecture, p. 81)

PUBLIC BUILDINGS

Hertfordshire County Hall, Hertford, England—JAMES & BYWATERS, ROWLAND PIERCE, ARCHITECTS. Central offices of this County Council are contained in a main building designed around a central courtyard, the rectangular plan relieved only by a council chamber wing in the form of a stilted semicircle which also gives an economical seating arrangement; adjacent secondary building containing the motor taxation department and county library served by the same heating and electrical plants. Photos, rendering, plot and floor plans. (Aug. Architectural Design and Construction, p. 211)

Town Hall at Aarhus, Denmark—ARUE JACOBSEN & ERIK MOLLER, ARCHITECTS. A modern 3-story building of reinforced concrete with copper roof, divided into three wings—the Hall and Council Chamber; general offices; the tower and larger administration offices. Photos, floor and plot plans. (Aug. The Architectural Review, p. 48)

RECREATION

Bowling Alleys

Bowling Alleys—DONALD DESKEY ASSOC., ARCHITECTURAL DESIGN CONSULTANTS. A group of prototype designs for alleys by the architectural research department of a bowling and billiard equipment manufacturer; 4-, 8-, and 12-lane alleys, for in-town or out-of-town sites. Sketches, floor and plot plans, details. (Sep. The Architectural Forum, p. 105)

RELIGION

Churches

Churches—Building Types Study. A study of modern church architecture, including an article on modern church and building costs, and presentation of projects for churches of all denominations by the following architects: Hills, Gilbertson and Hayers; Vincent G. Raney; John J. Flad; Robert Stanton; Paul Thiry; Samuel E. Lunden and S. Charles Lee; Arthur Fehr and Charles Granger; George J. Adams; Naramore, Bain, Brady and Johanson; Donald W. Edmundson; Charles D. Faulkner; Dent & Aydelott; Barber & McMurry. Photos, renderings, floor plans. (Oct. Architectural Record, p. 95)

TRANSPORTATION

Sea-Land Transfer—RICHARD J. NEUTRA, ARCHITECT. An article, illustrated by the author's own sketches, discussing planning of seaports and their immediate environs, based on the thesis that "a seaport constitutes a link in a vastly extended national and global machine, but it also constitutes a community, with human requirements and contemporary living standards." Sketches, photos. (Sep. Architectural Record, p. 75)

Airlines

Housing for the Skymasters, Los Angeles, Calif.—THE AUSTIN CO., ENGINEERS. Western Air Lines' new hangar-maintenance building, 300 x 600 ft., is a huge "service station" actually, and called for much resourcefulness to make it strictly functional and efficient in plan. Photo, renderings. (July Architect and Engineer, p. 12)

Air Terminal, Long Beach, Calif.—KENNETH S. WING, ARCHITECT. To allow for expansion, this building for a small field was designed as a small curved segment of a large wagon wheel, permitting additions to be built on either end to form a semicircle. Photos, floor plans. (Oct. The Architectural Forum, p. 94)

Car Parks

Underground Parking in Kansas City, Mo.—GENTRY & VOSKAMP, ARCHITECTS. Preliminary plans have been drawn for the construction of an underground parking garage for 1800 cars, with the floor of the garage to follow the pitch of the streets to reduce construction costs. Rendering. (Aug. The American City, p. 109)

Municipality Finances Parking Building, Bluefield, W. Va.—ALEX B. MAHOOD, ARCHITECT. This proposed parking building is to be open-sided, of 800-car capacity, with four parking floors, the concrete roof being the fourth floor. Rendering. (Sep. The American City, p. 120)

Garages

Garage, Toronto Branch, The Canadian Red Cross Society—PAGE AND STEELE, ARCHITECTS. Photos. (July Journal of the R.A.I.C., p. 168)

Wythenshawe Shell Concrete Bus Garage—G. NOEL HILL, ARCHITECT. The shell roof of this garage has a clear span of 168 ft. and is supported by continuous arch beams set at close centers; accommodates 100 double-decker buses. Photos, floor plans, sections. (The Architects' Journal for Sep. 5, p. 176)

Truck Terminal, Jersey City, N. J.—KELLY & GRUZEN, ARCHITECTS-ENGINEERS. Efficiency of plan rather than architectural appearance, inside or out, was emphasized in this truck freight terminal-drivers' dormitory. Photos, floor plans. (Oct. The Architectural Forum, p. 95)

Railroads

Railroad Station, Prince, W. Va.—GARFIELD, HARRIS ROBINSON & SCHAFER, ARCHITECTS. A handsome new station for a small town, the 19 x 55 ft. central waiting-office room exaggerating its size with full side-wall windows from floor to 18-ft. ceiling. Photos, floor plans. (Oct. The Architectural Forum, p. 96)

PERIODICALS NOTED IN THIS ISSUE:

ARCHITECT AND ENGINEER, 68 Post St., San Francisco 4, Calif.

ARCHITECTURAL DESIGN AND CONSTRUCTION, 26 Bloomsbury Way, London W.C.1, England

ARCHITECTURAL RECORD, 119 W. 40th St., New York, N. Y.

CANADIAN HOMES AND GARDENS, Montreal Centre 2, Dominion Square Bldg., Toronto 2, Canada

JOURNAL OF THE R.A.I.C., 57 Queen Street West, Toronto 1, Canada

LADIES' HOME JOURNAL, 1270 Sixth Ave., New York, N. Y.

PROGRESSIVE ARCHITECTURE-PENCIL POINTS, 330 W. 42nd St., New York 18, N. Y.

THE AMERICAN CITY, 470 Fourth Ave., New York 16, N. Y.

THE AMERICAN HOME, 444 Madison Ave., New York, N. Y.

THE ARCHITECTS' JOURNAL, 13, Queen Anne's Gate, Westminster, S.W.1, England

THE ARCHITECTURAL FORUM, 350 Fifth Ave., New York 1, N. Y.

THE ARCHITECTURAL REVIEW, 13, Queen Anne's Gate, Westminster, S.W.1, England

THE MODERN HOSPITAL, 919 N. Michigan Ave., Chicago 11, Ill.

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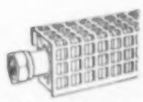

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OBSERVATIONS

PLAN FOR PERMANENT WORLD CAPITOL at Flushing Meadow Park; New York City Mayor's Committee on Plan and Scope. Board of Design: Gilmore D. Clarke, Chairman; W. Earle Andrews, Aymar Embury II, Wallace K. Harrison, John P. Hogan, Louis Skidmore.

LAST MONTH IN THIS SPACE I MADE SOME RATHER BANTERING REMARKS ABOUT ARCHITECTURAL CRITICISM. To compensate for that unseemly levity on a serious matter, I would like to recommend a very able, very readable work which touches on the subject—*The Basis of Criticism in the Arts*, by Stephen Coburn Pepper, Professor of Philosophy and Aesthetics in the University of California, published by the Harvard University Press. Professor Pepper reviews all of the accepted philosophical systems to discover their various approaches to esthetics, and reduces the possible reactions to an esthetic experience to four main types. These he ably translates into criteria, or bases for judgment and criticism. His recommendation to critics, then, is to reach an empirical conclusion by examining any work of art from four philosophical angles. Not to hold you in suspense, the four manners of criticism are the **mechanistic** (does the object give you pleasure, sensually, by its design?); the **contextualistic** (is the *situation* in which the object is viewed a contributory factor to the intensity and depth of the esthetic experience?); **organistic** (is the art form an integrated, coherent thing, producing the reaction of organic unity?); **formistic** (can the object be identified as representing its time and its culture, as fulfilling its function and its genre, and thus giving esthetic satisfaction to the normal, well developed individual?).

We are always freshly astounded at the way a rationalized approach to the question of architecture clears the boards of all the cluttered clichés which are used to impede progress. Viewed by the criteria described, a stylized bit of "good" architecture retains only one small shred of esthetic validity—its formistic appeal because of the forced familiarity of the style which is copied. Progressive designers have been contending for generations that the restriction of criticism to this one phase would forever prevent change; Professor Pepper's approach (which is, subconsciously, the approach of any honest critic) reduces this criterion to its proper relative value.

The spread of objective critical judgment is most important; there is all too ready the snap analysis which separates "modern" from "traditional" and calls all of one good and all of the other bad, depending on the point of view. I heard a critic at a Beaux-Arts judgment recently say, "That's a good elevation—it's nice and modern." As a matter of fact, in its lack of unity, its disorganized pattern, its poor integration of materials, its awkward relation to other buildings, it was bad. Here lies the fallacy in "modernizing" a classical conception; here is the great possibility when free, fresh analysis of a problem is permitted: objective criticism will class the building as good or bad on the basis of rational criteria, in which recognition of forms will play only a small part.

•

IN ANY EVENT, I EXPECT THAT IT WILL BE VERY CONVENIENT TO MAKE PRONOUNCEMENTS AND BLAME THEM ON PROFESSOR PEPPER rather than my own prejudices. For example, before me lies the very handsome brochure prepared by the City of New York to persuade the United Nations to settle in Flushing Meadows. There are renderings by Hugh Ferriss of hypothetical buildings designed by an impressive array of first-rate progressive architects. I wonder why it depresses me. So I turn to philosophical esthetic criticism.

1. **Mechanistically**, I must admire the project. No flaw can be found in the pure design aspects of the buildings. Sensually, in unity, in contrast, in theme and variation, in pattern, the judgment must be favorable.

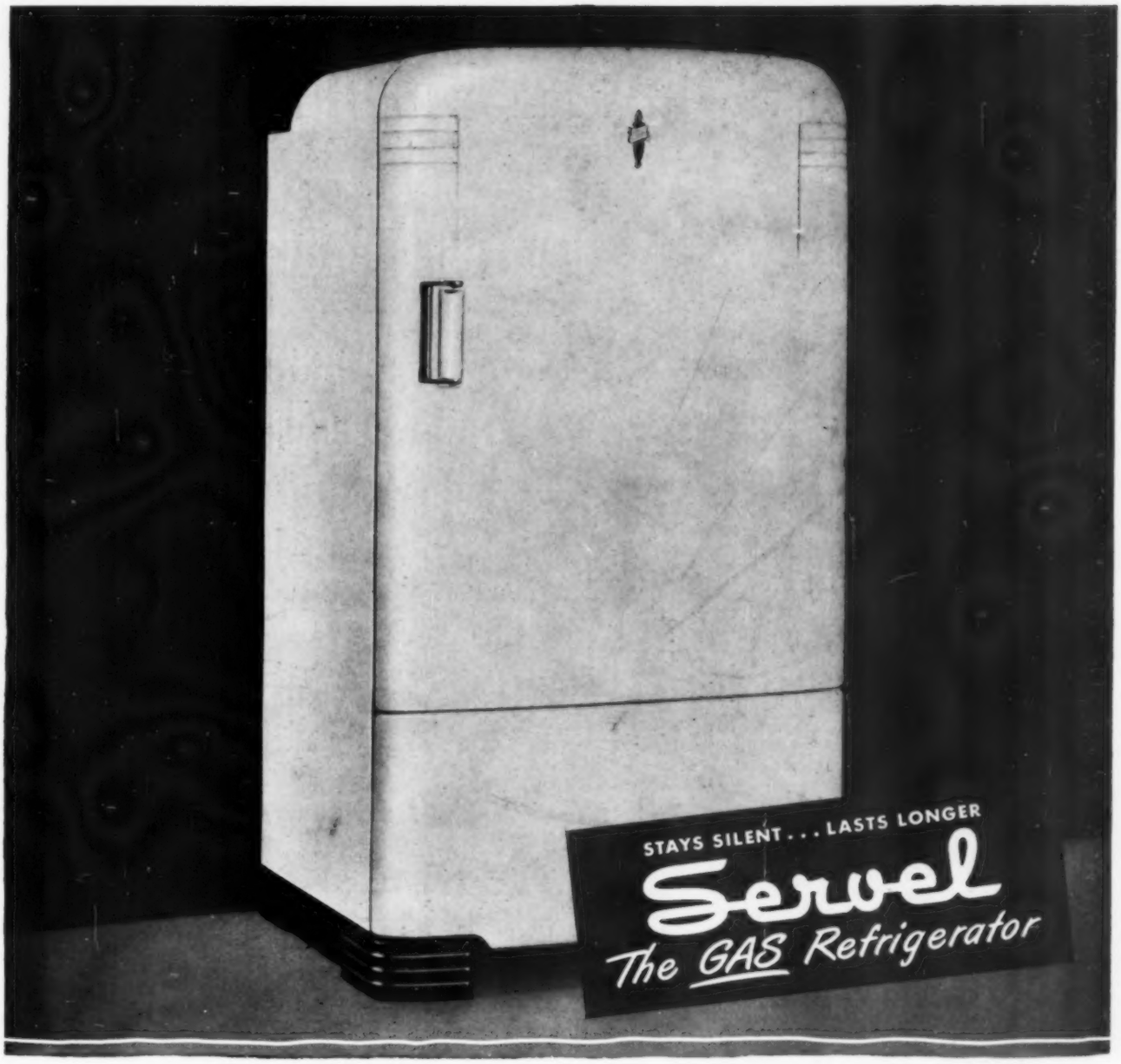
2. **Contextualistically**, I have to enter a negative vote, for several reasons. I find that my mental concept of U.N. and its administrative center is violated by the grand, over-scaled, awe-inspiring conception. The vistas, the vast interiors make me think of boasting rather than good will; of force rather than handshakes; of sightseers rather than delegates. In addition, twice each day I ride past the poor semi-slums that ring the "meadows," and I can only shudder at the thought of pylons and reflecting pools in that context.

3. **Organistically**, I'm afraid I have no reaction. It is hard to visualize materials from these drawings, and while the plan has unity, there is a conglomeration of elements (admirable though they are in themselves) which is somewhat disturbing. No vote here.

4. **Formistically**, I think the critical judgment must be strongly adverse. The design in question cannot be called representative, either of traditional or more recent concepts of serious public buildings. It will set up streams of recognition, but I fear that functions and purposes quite different from those intended will be recalled by the forms and the mannerisms used. They are recognizable to the normal man; they will probably appeal to him. So did Nuremberg and the New York World's Fair, back in 1939.

Of course the architects concerned, and Mr. Robert Moses, and Mayor O'Dwyer will understand that any such thoughts that arise anywhere are purely philosophical and should not interfere with their sales campaign.

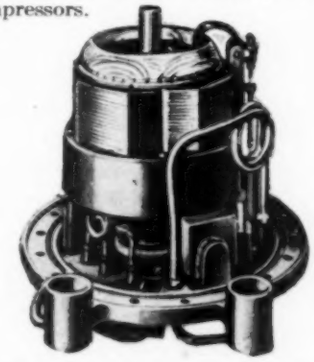
Thomas H. Creighton



BUT SERVEL CHANGES VAPOR BACK TO LIQUID WITHOUT MOVING PARTS

HERE'S THE DIFFERENCE

In an electric refrigerator, the vapor is compressed back into a liquid by use of machinery. This machinery consists of a motor, valves, pumps and compressors.



In the Gas Refrigerator, the vapor is changed back into a liquid by first being passed through water. The water absorbs the ammonia. The mixture is then boiled by means of a tiny gas flame. The ammonia is driven off in the form of hot ammonia vapor. Cooled by passing through pipes, it condenses again into liquid ammonia. Not a single moving part is needed.

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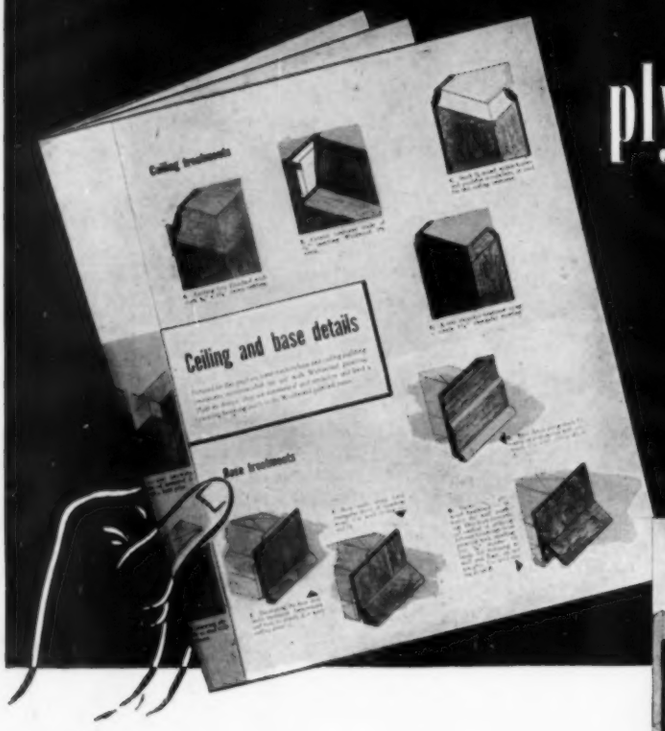

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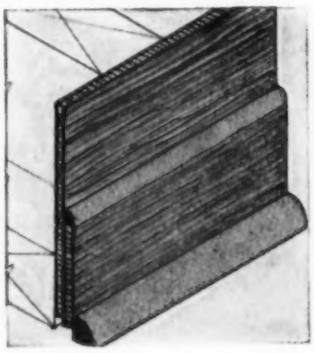
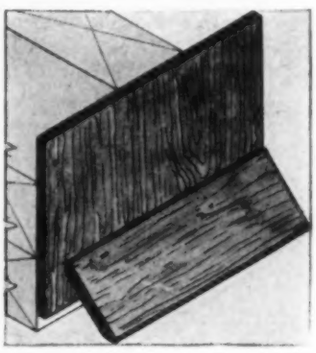
BELOW: Matching base using stock ¼ round in conjunction with plywood strip.

ABOVE: Cornice treatment made of ¼" matching Weldwood Plywood.

BELOW: Economical baseboard detail utilizing leftover trimmings from plywood wall paneling.





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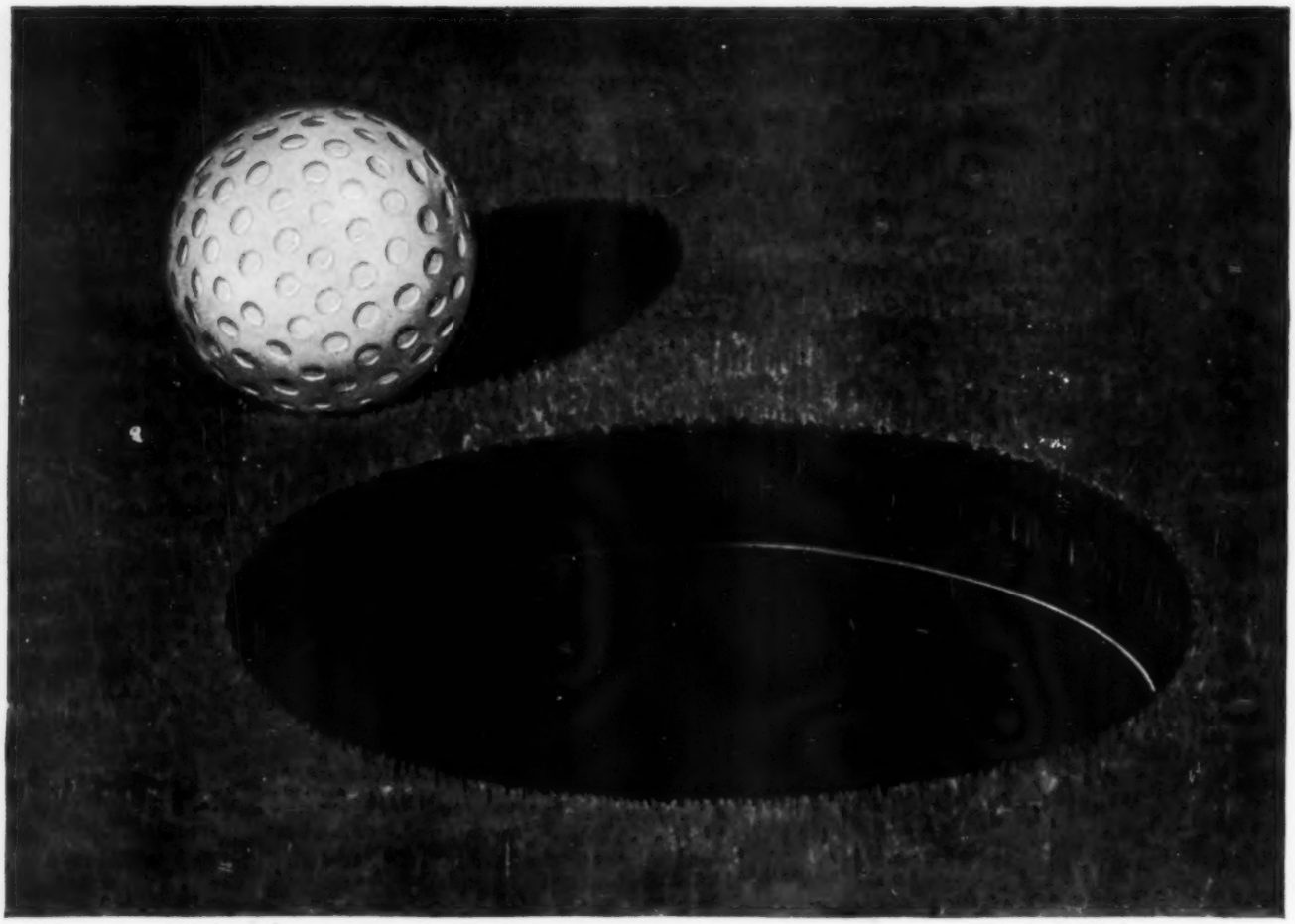

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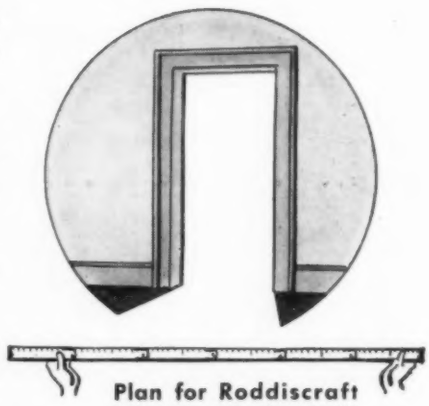

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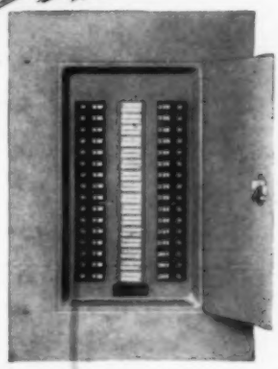

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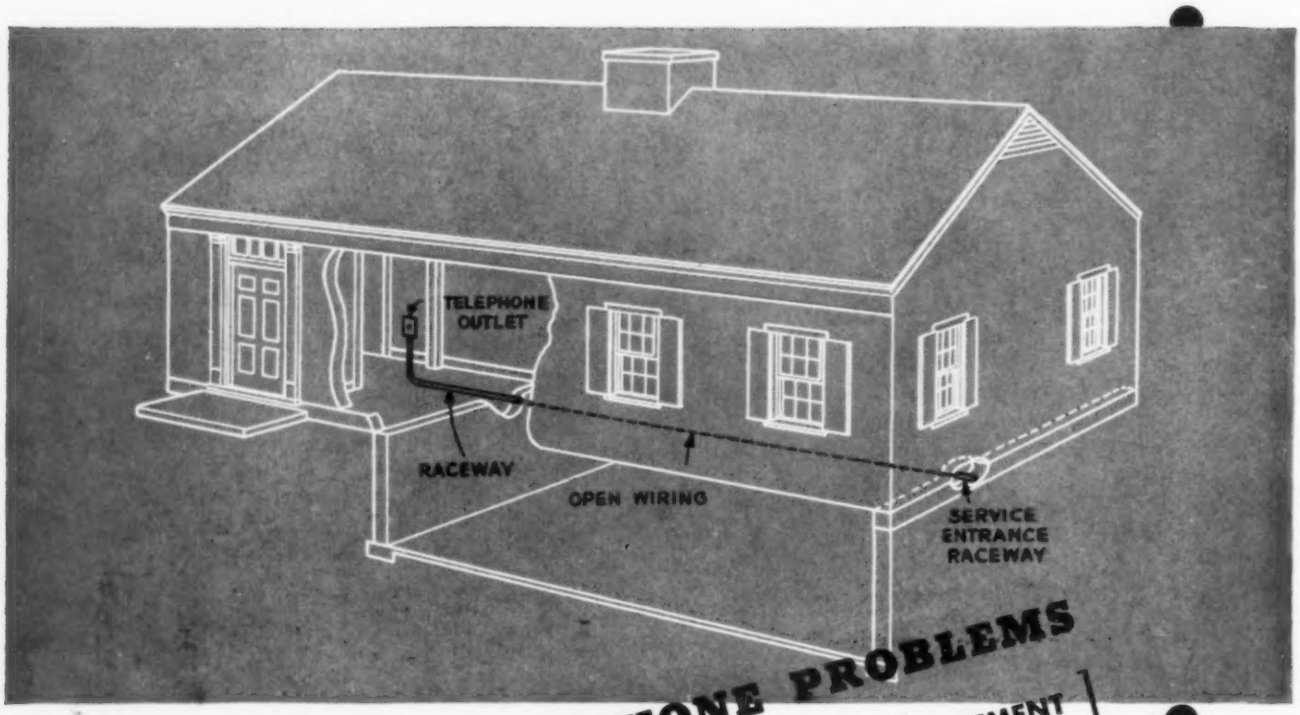

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[THE CASE OF THE ONE-STORY HOUSE WITH UNFINISHED BASEMENT]

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Youngstown Steel Pipe has been used successfully in radiant or panel heating service for many years, as this old advertisement shows.

THIS is an advertisement published six years ago--three years after Denison Bingham Hull, Winnetka, Ill., architect, had installed a panel heating system in his new home. He used Youngstown Steel Pipe and at that time stated that the system was performing 100% satisfactorily.

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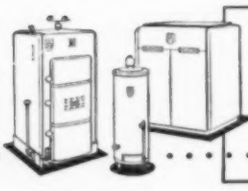

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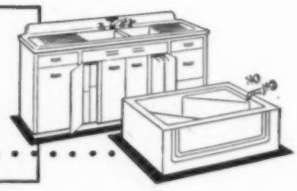

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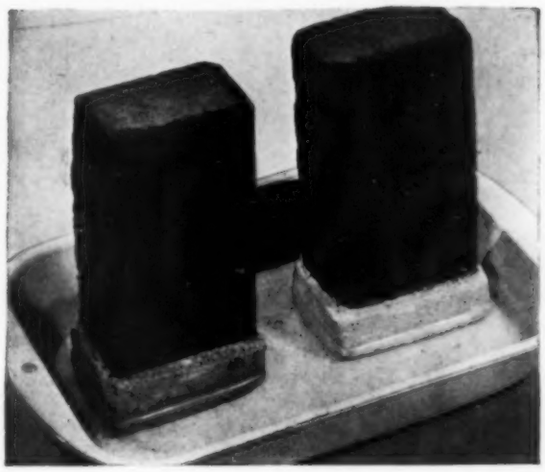
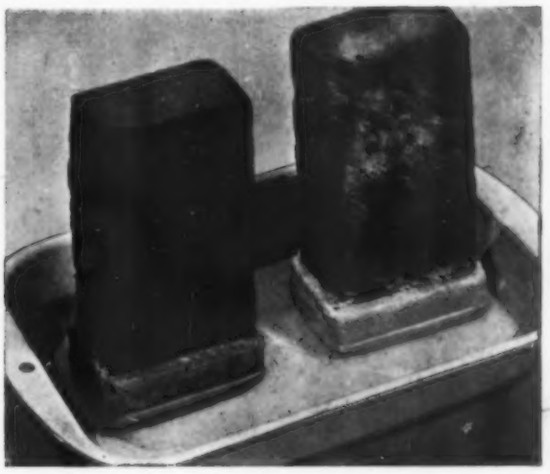


To test two mortars for resistance to efflorescence, "cap" two brick heavily with the mortars—let harden, and



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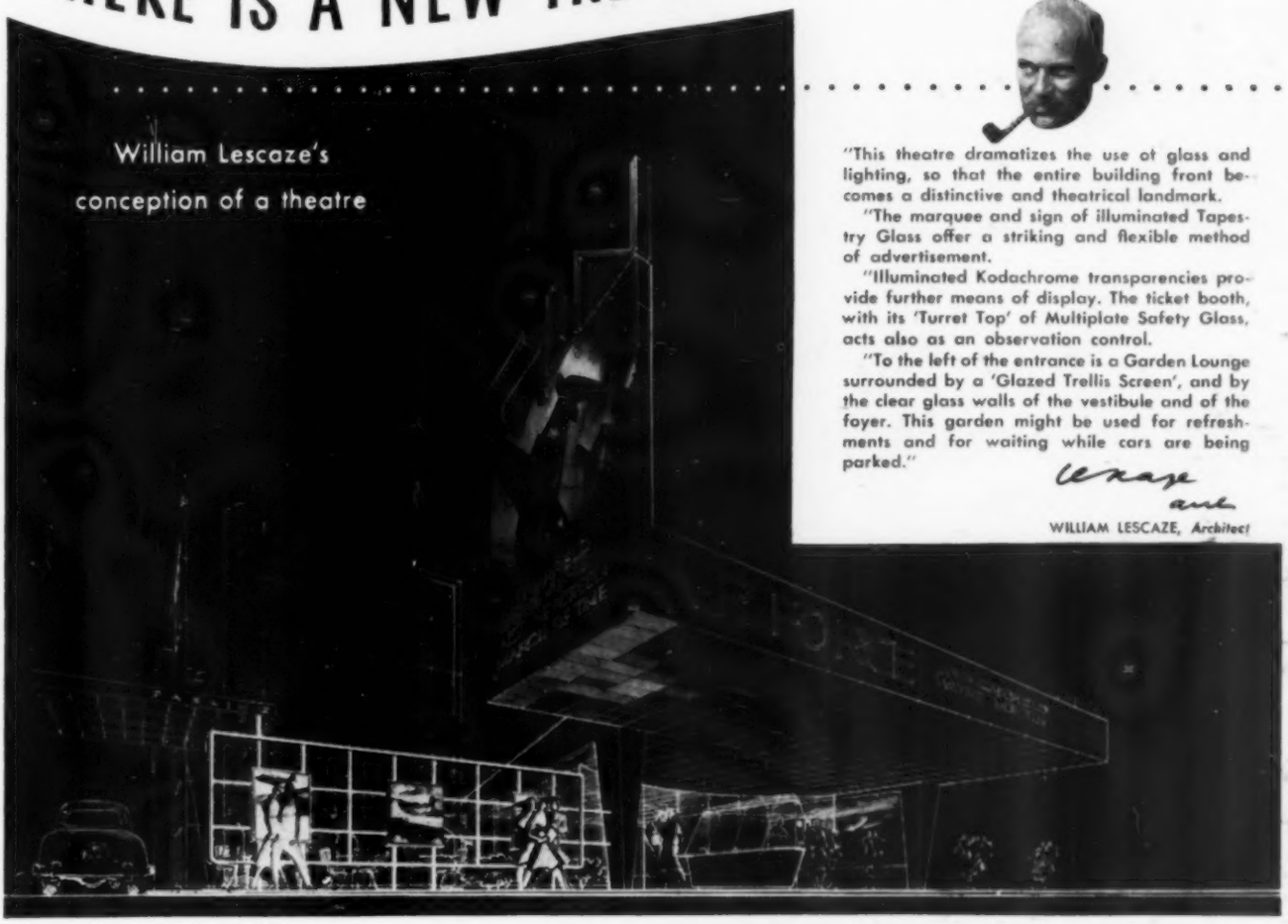
THERE IS A NEW TREND IN STORE DESIGN

William Lescaze's
conception of a theatre



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"The marquee and sign of illuminated Tapestry Glass offer a striking and flexible method of advertisement.

"Illuminated Kodachrome transparencies provide further means of display. The ticket booth, with its 'Turret Top' of Multiplate Safety Glass, acts also as an observation control.

"To the left of the entrance is a Garden Lounge surrounded by a 'Glazed Trellis Screen', and by the clear glass walls of the vestibule and of the foyer. This garden might be used for refreshments and for waiting while cars are being parked."

WILLIAM LESCAZE, *Architect*

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SEND FOR THIS FREE BOOK

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"PITTSBURGH" STORE FRONTS AND INTERIORS

Pittsburgh Plate Glass Company
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Please send me, without obligation, a free copy of the book, "How Eye-Appeal—*Inside and Out*—Increases Retail Sales".

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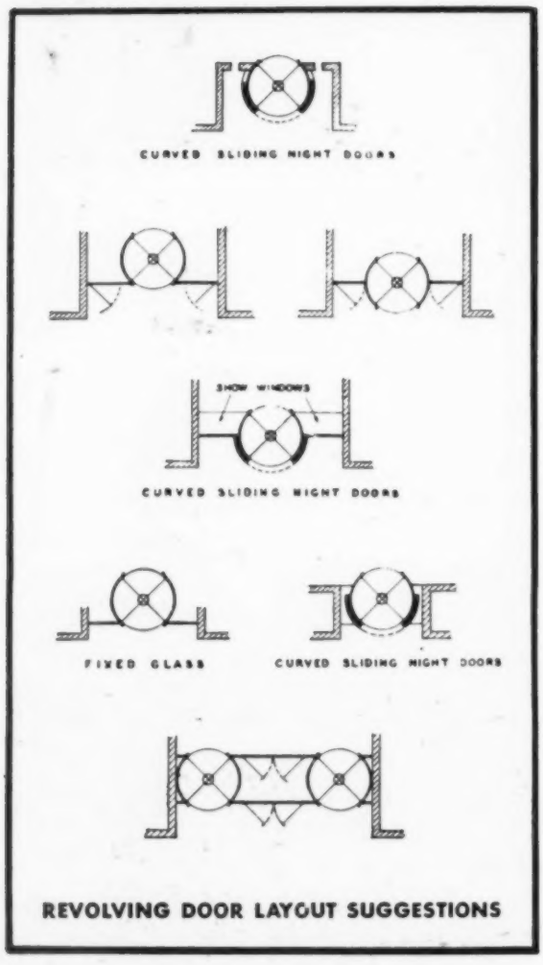
"PITTSBURGH" *stands for Quality Glass and Paint*

PITTSBURGH PLATE GLASS COMPANY

Entrance to STOUFFER'S RESTAURANT in New York City.
Doors and metal work by General Bronze.

One of more than 60 GB revolving doors at ROCKEFELLER CENTER



REVOLVING DOOR LAYOUT SUGGESTIONS

GB ALL METAL REVOLVING DOORS

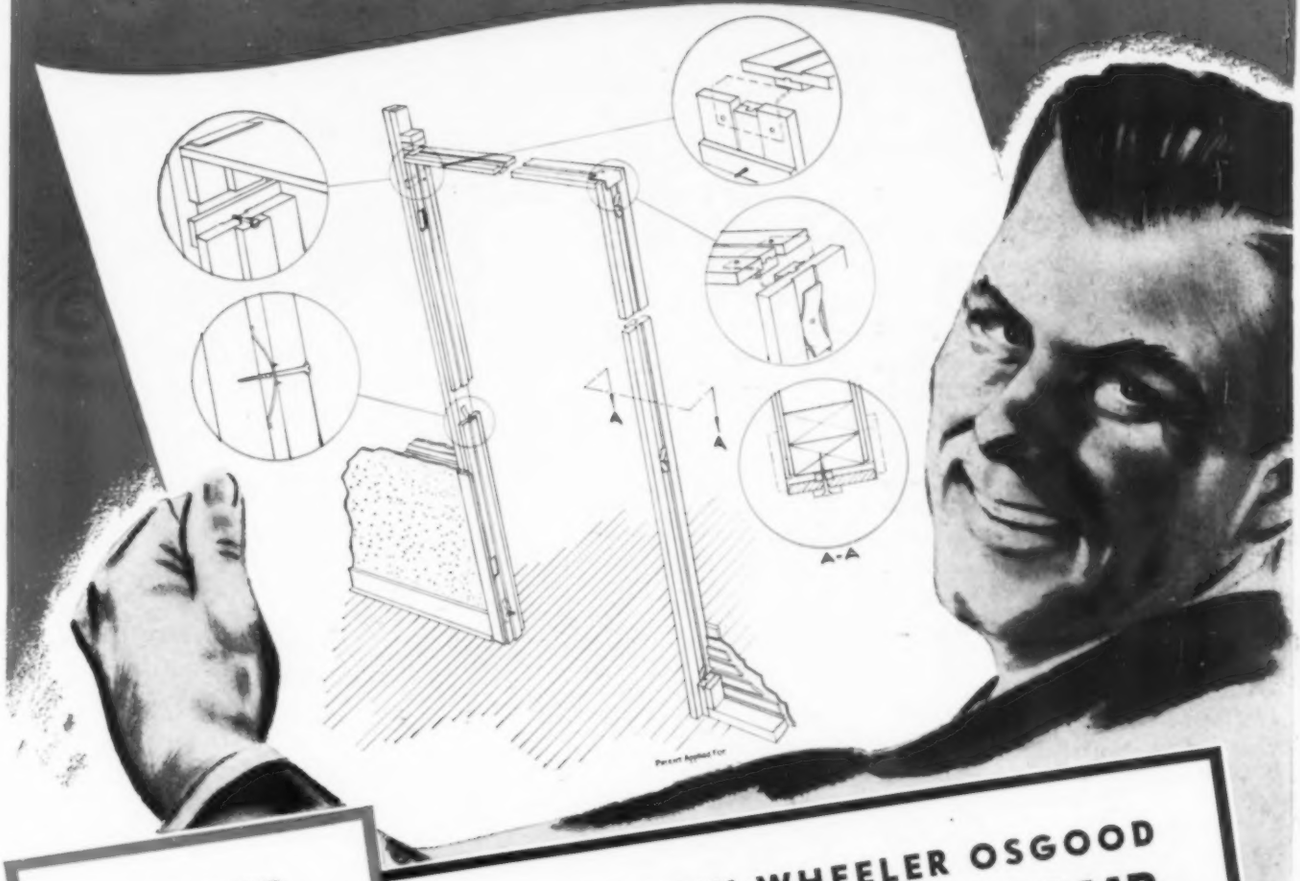
GB revolving doors are a worthy addition to your finest buildings. These handsome, easy-operating doors embody features developed in thirty-five years' experience in fabricating non-ferrous metal products for the building industry. They are engineered to meet modern requirements and can be detailed to harmonize with the architectural treatment of the entrance.

GB revolving doors have been specified by many of the country's foremost architects for their finest buildings. Hundreds of installations in notable buildings all over the United States are constant reminders of their excellence. As you design new structures or the remodeling of old ones plan to use GB revolving doors. Write today for our catalog or consult Sweet's.

GENERAL BRONZE CORPORATION

34-11 TENTH STREET LONG ISLAND CITY 1, N. Y.

LOOK you've never seen a *Door Jamb* like this before . . . . .



CHECK THESE AMAZING FEATURES

- Adjustable to variations in sizes of door.
- Cuts installation time from 1-1½ hours to 8-10 minutes!
- No nailing! Only three precision milled pieces to handle on the job!
- "Shock - Absorber" Springs assure accurate fit for life of building!

IT'S THE NEW WHEELER OSGOOD *Tru-sized* DOOR JAMB

REG. U. S. PAT. OFF.

THE MOST ADVANCED IDEA IN DOOR JAMB HISTORY

The amazing new Tru-Sized Door Jamb *(Pat. applied for)* is your door-way to great savings in time, work and money! . . . There's *no* planing, *no* trimming, *no* squaring—the tedious, time-consuming work of making dados, placing and fitting blocks, squaring and plumbing with wedges, gaining for hinges, and cutting and installing stops is either *eliminated or done at the factory!* . . . You quickly and easily adjust door clear-ance with a screwdriver, and the "Shock-Absorber" Springs assure per-manent accuracy of fit.

Look into the advantages of the new Tru-Sized Jamb TODAY!

THE WHEELER, OSGOOD COMPANY

Plants and General Office: Tacoma 1, Washington

NEW YORK OFFICE	1326 Empire State Building, New York 1, New York	Phone: Penn. 6-2954
CHICAGO OFFICE	134 So. LaSalle Street, Chicago 3, Illinois	Phone: State 5335-6-7
SAN FRANCISCO OFFICE	3045 19th Street, San Francisco, California	Phone: Valencia 2241
LOS ANGELES OFFICE	P. O. Box 7685 Del Valle Station, Los Angeles 15, Calif.	Phone: Vandike 6326
TACOMA OFFICE	1216 St. Paul Avenue, Tacoma 1, Washington	Phone: Main 8101

"Clients well satisfied with PETRO"

• When does an oil burning heating system render satisfactory performance? How can you tell that the installation you and your staff so painstakingly planned is measuring up to your expectations?

Only the client can give the determining answer. He it is who knows whether the system contributes to the building occupants' comfort, convenience, health . . . whether it runs smoothly, assuring freedom from drudgery, costly maintenance and annoying interruptions on the one hand as well as promoting the anticipated economies on the other.

It is the client, too, who can tell you that Petro Oil Burning Systems meet these exacting requirements. Incorporating only those time-tested principles of design and construction that, as the result of 40 years experience, have become Petro "know-how", Petro Oil Burning Systems welcome your thorough investigation for installation wherever "utmost efficiency and low operating costs" become *first* considerations.

No wonder professional consultants such as Mr. Rosario Candela, who are competent to evaluate heating performance correctly, unanimously agree that "clients are well satisfied with Petro."

INDUSTRIAL MODELS: No. 5 or No. 6 fuel oil; manual, semi- or automatic operation; 8 sizes to 450 bhp. Thermal Viscosity preheating.

DOMESTIC MODELS: No. 3 or light oils; "conversion" and combination-unit types, 7 sizes. Patented "Tubular Atomization."

FULL DATA on Petro Industrial Burners are in catalog files of Sweet's and Domestic Engineering. Details on Petro Domestic Burners available in separate catalog. Copy of either sent gladly on request.

PETRO
REG. U S. PAT. OFF.

cuts steam costs

ROSARIO CANDELA, *New York architect, is known for many outstanding apartment buildings. He has had extensive experience with the use of oil for heating and his comments on liquid fuel are of unusual interest:*

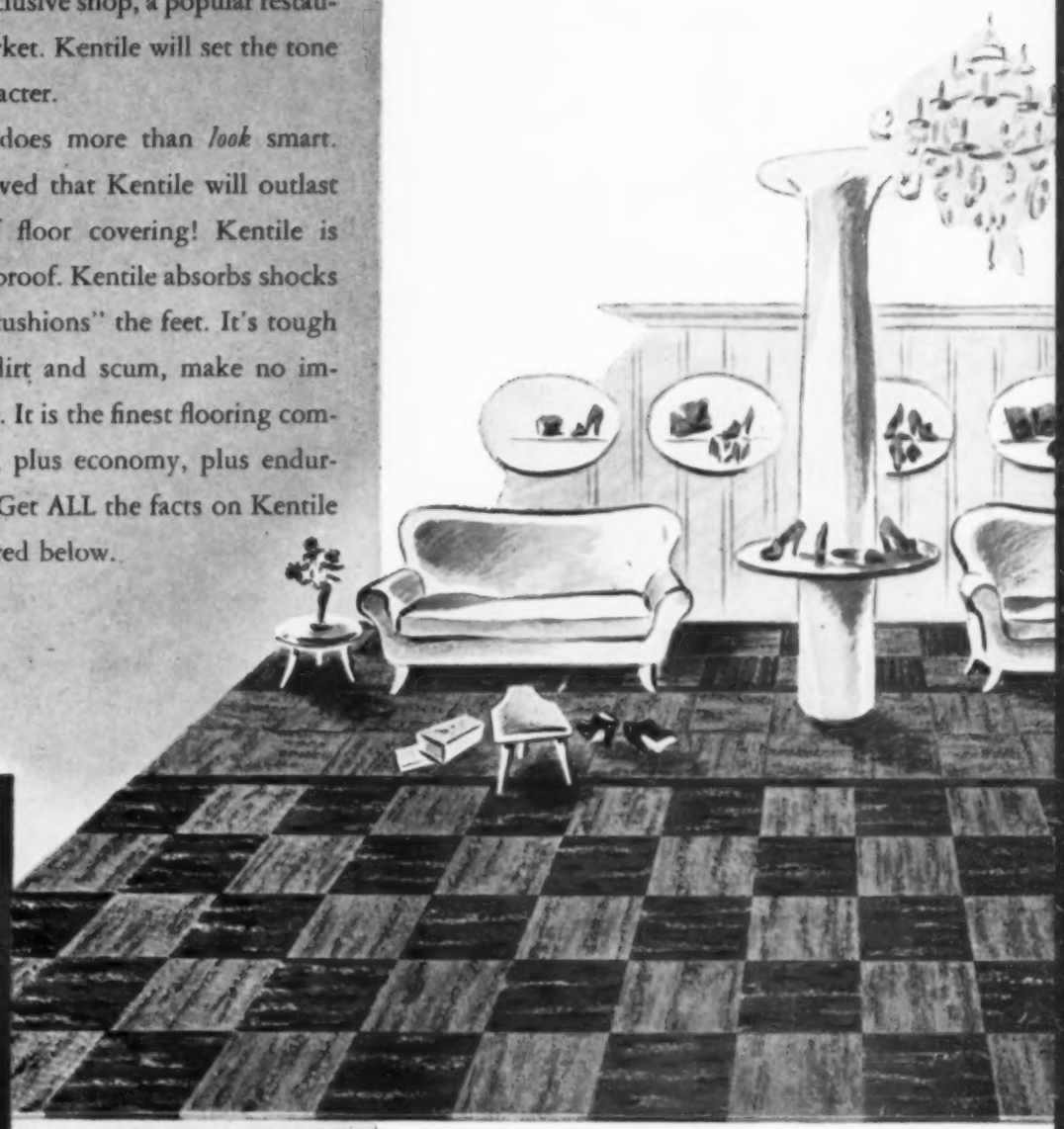
"The advantages of liquid fuels are manifold and their use will probably be more widely adopted in the building of the future than in prewar days. I have found that oil heating renders comfort and convenience to the occupants of a building, thereby resulting in an environment that attracts trade and pleases tenants. I have often used the Petro System and in my experience it possesses utmost efficiency and low operating costs. Clients are well satisfied with its performance.

PETROLEUM HEAT AND POWER CO. • *Makers of Good Oil Burning Equipment Since 1903* • *Stamford, Connecticut*

THE BETTER TO SHOW YOUR SHOES, SIR!

Eye-appeal can influence many a sale. And eye-appeal can start with your Kentile floor—anywhere—in an exclusive shop, a popular restaurant, or a super-market. Kentile will set the tone and define the character.

But Kentile does more than *look* smart. Experience has proved that Kentile will outlast any other type of floor covering! Kentile is moisture and stain proof. Kentile absorbs shocks and sounds, and "cushions" the feet. It's tough—stabbing heels, dirt and scum, make no impression on Kentile. It is the finest flooring combination of beauty, plus economy, plus endurance you can find. Get ALL the facts on Kentile in the booklet offered below.



DURABLE! Kentile is virtually unequalled for wear. It shows no mop marks, isn't scarred by scuffing. Never curls or buckles, isn't roughened by friction! Kentile floors, laid 14 years ago in Rockefeller Center, show no signs of traffic wear.

ECONOMICAL! Kentile is the lowest cost type of flooring you could buy. In addition, it wears indefinitely—never loses its colors—and can be laid faster!

VERSATILE! Not only does Kentile permit you to have your own individual color schemes and designs, but alterations in floor planning are simple—the necessary new tiles are the only ones that must be laid.

Altogether, Kentile offers 15 different advantages. They're all told in the *new*, richly illustrated full-color catalogue that shows all the Kentile colors and some of the countless patterns possible—plus full-color pictures of Kentile in actual use. Send for your copy today—no obligation.

KENTILE
Asphalt Tile
Trade Mark Reg.

DAVID E. KENNEDY, Inc.
68 Second Avenue, Brooklyn 15, N. Y.
208 Bona Allen Bldg., Atlanta 3, Ga.
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614 Olympia Road, Pittsburgh 11, Pa.
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• Stringent times of supply scarcities have demonstrated that there is no substitute for quality. This fact will be remembered.

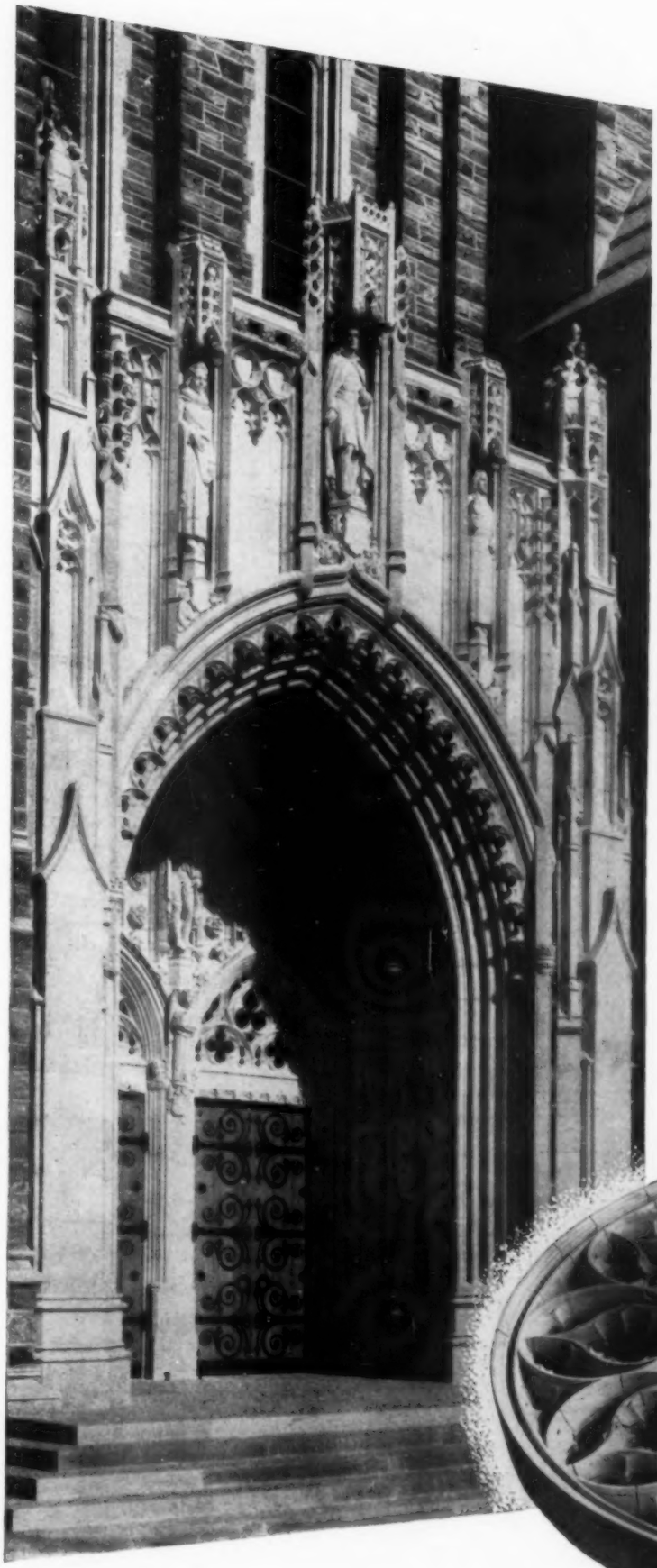
"Quality", long a word with but abstract meaning for many, once again is clear to all. It means that substitute products, whether high or low in price, whether they be tires, cigarettes or clothing, do not deliver full value. They do not give the lasting satisfaction inherent in established, trademarked, high quality goods.

Everyone will benefit from this awakened consciousness that quality is the yardstick by which all goods and services should be measured. And rest assured that high quality craftsmanship and materials — always traditional with P. & F. Corbin — will produce quality builders hardware to meet *every* demand.

P. & F. Corbin Division

THE AMERICAN HARDWARE CORPORATION

NEW BRITAIN, CONNECTICUT • SINCE 1849



"BEAUTY . . . doth of itself persuade the eyes of men without an orator"

—SHAKESPEARE

★ Indiana Limestone is America's most frequently specified stone not only because of *its own* ineffable beauty, but because it is so oratorical a medium of the *further* beauty and utility created by the architect.

It is free of cleavage plane, uniquely suited to machine finishes, *moderately priced* and tested for exact fit before shipment from our companies for such uses as those here pictured—entrance detail, Duke University Chapel (Horace Trumbauer, architect) and the huge rose window of Holy Rosary Church, Pittsburgh (Cram & Ferguson, architects).

You are welcome to the personal counsel of our Technical Division, backed by a century's experience in all applications of every variety of Indiana Limestone.

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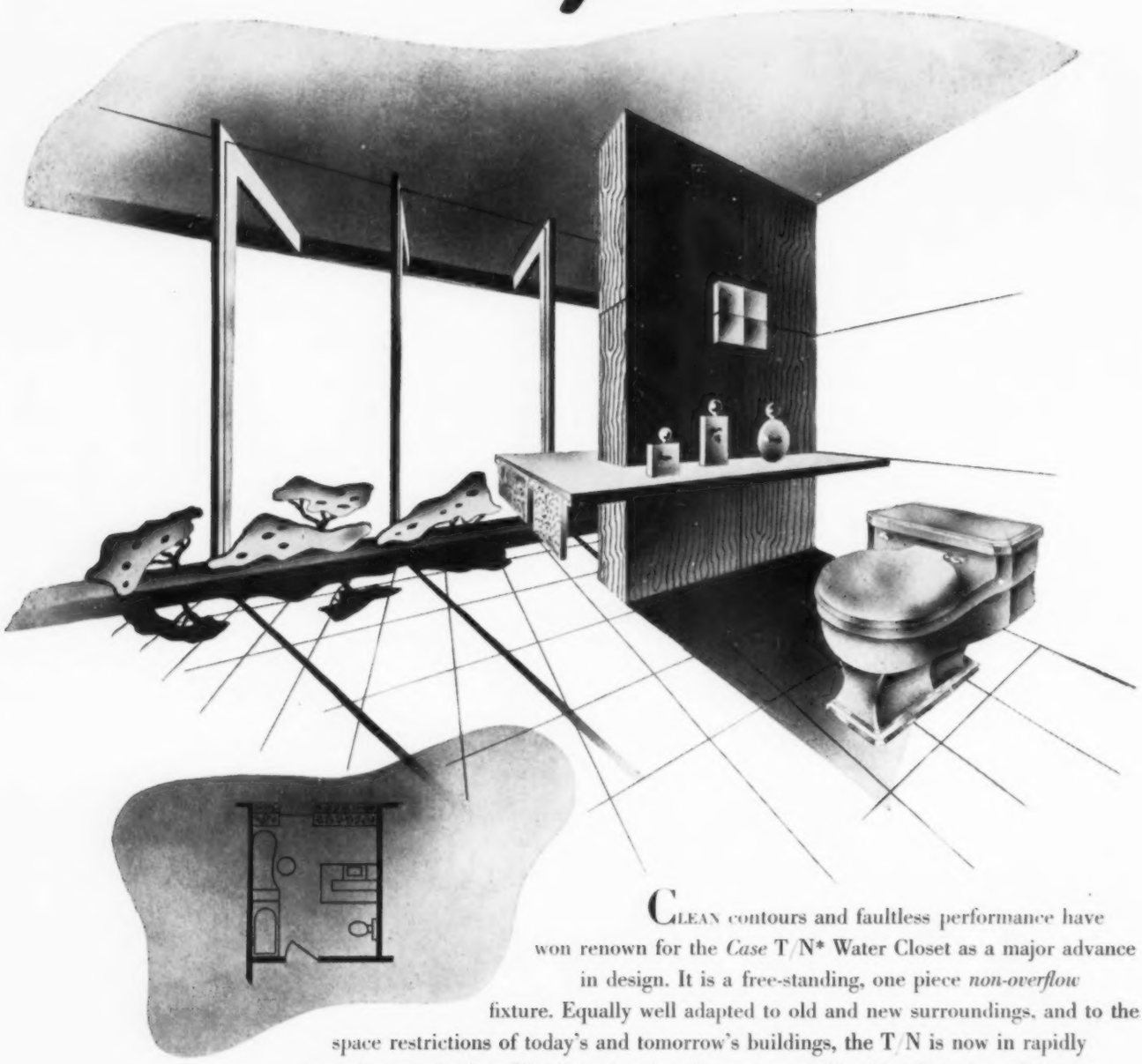
P. O. Box 471 • BEDFORD, INDIANA

You Are Invited to Forward Plans and Specifications to the Institute for Competitive Cost Estimates by Our Member Companies

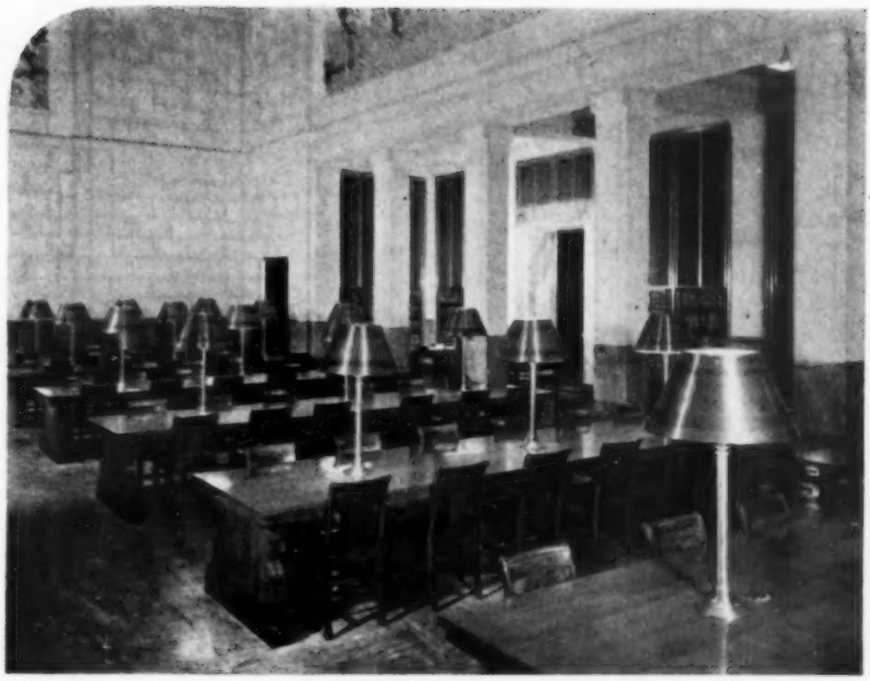
Contemporary ... *for years to come*



CLEAN contours and faultless performance have won renown for the *Case* T/N* Water Closet as a major advance in design. It is a free-standing, one piece *non-overflow* fixture. Equally well adapted to old and new surroundings, and to the space restrictions of today's and tomorrow's buildings, the T/N is now in rapidly expanding production. Distributed nationally—see your Classified Telephone Directory. W. A. Case & Son Mfg. Co., Buffalo 3, New York. Founded 1853.

*PATENTED

Foremost in demand ... the Case T/N



REALWOOD

FOR DIGNITY,

FORMICA laminated plastic surfacing material is so flexible in color and patterns that it is adaptable to any kind of installation from the most dignified and permanent to "jive" color combinations that may be desired for cocktail rooms or theaters. ¶The color photograph shown above represents the reading tables surfaced with Formica "Realwood" in the reading room of the annex to the Congressional Library in Washington, where a great deal of Formica was used both for dignity and durability. ¶Below is the cocktail lounge of the Statler Hotel at Washington where something livelier was desired. ¶In either case the practical wearing qualities of the material are the same. It is non-porous and unstainable, cigarette-proof on horizontal surfaces, washable with soap and water or with solvents—and extremely long wearing and durable. There is no painting or refinishing required ever—no maintenance, no time out of service, no trouble.

THE FORMICA INSULATION COMPANY, 4639 SPRING GROVE AVENUE, CINCINNATI 32, OHIO

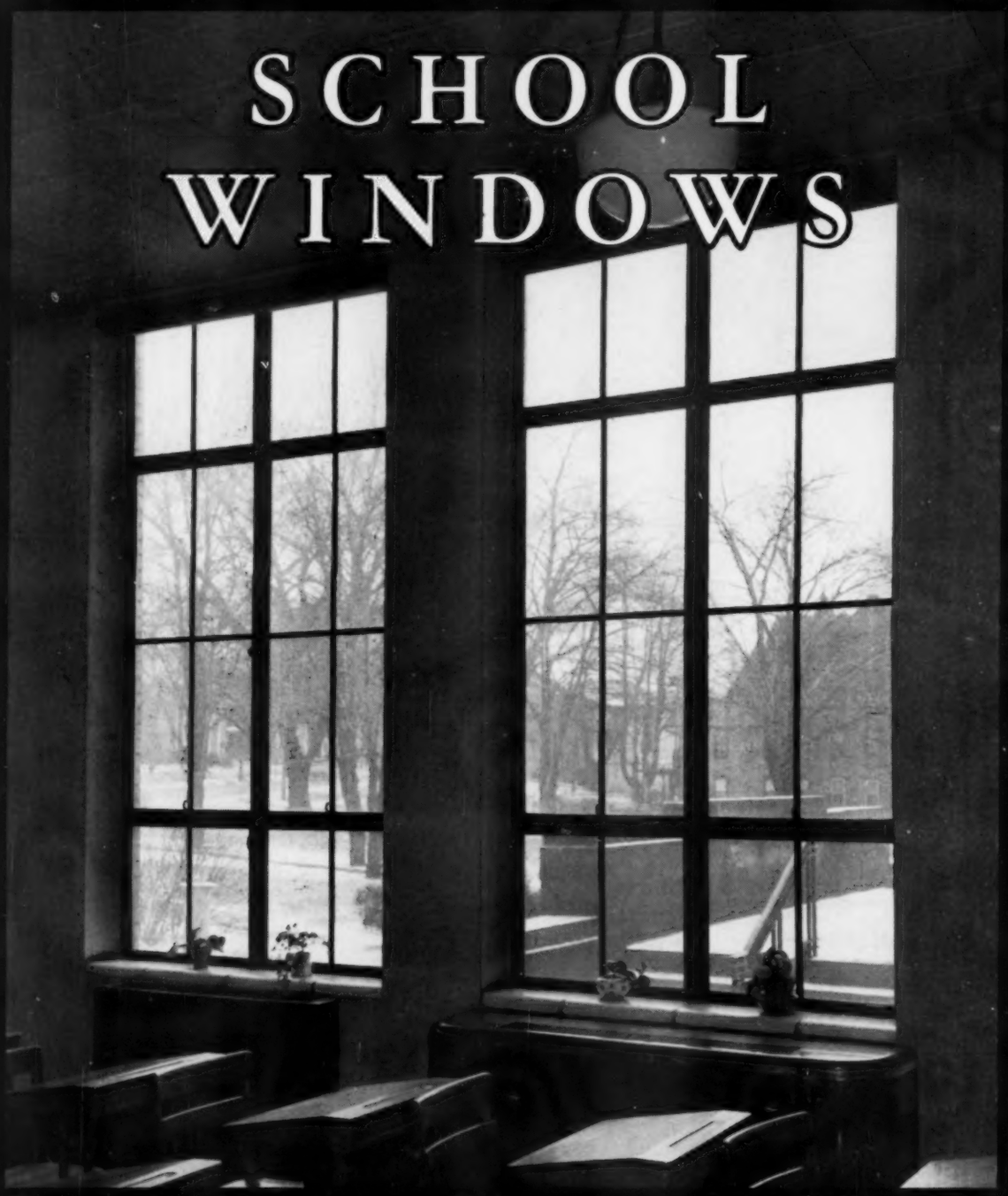
Color

FOR A THRILL!

FORMICA

TRADEMARK REG. U. S. PAT. OFF.

SCHOOL WINDOWS



Jamestown High School, Jamestown, N. Y. — *Beck & Tinkham, Arch'ts*

FULL INFORMATION AND DETAILS OF THE STEEL WINDOWS ILLUSTRATED CAN BE OBTAINED BY APPLYING TO OUR HEAD OFFICE IN JAMESTOWN, N. Y. OR TO ANY BRANCH OFFICE OR REPRESENTATIVE. OUR ENGINEERING DEPARTMENT WILL BE GLAD TO PREPARE SPECIAL DRAWINGS TO SUIT UNUSUAL CONDITIONS ON REQUEST.

HOPE'S WINDOWS, INC., *Jamestown, N. Y.*

THE FINEST BUILDINGS THROUGHOUT THE WORLD ARE FITTED WITH HOPE'S WINDOWS

Clients expect refinements like

THREE HINGES ON EVERY DOOR"

More and more people are discovering the real economy of *three hinges on every door*.... They are learning that the two or three dollars initial hinge expense per home is hardly a fraction of the cost of repairing one warped door later on.

When you specify three hinges on *every* door you are guarding against warping at the jamb, helping to keep latches and locks clicking to a perfect fit, summer and winter.

Your clients will appreciate this visible proof of sound planning . . . it will help convince them that you design truly well-built homes.

Always specify *three* hinges to a door. The Stanley Works, New Britain, Connecticut.

STANLEY

Trade Mark

REMEMBER . . . . . THREE HINGES TO A DOOR

MOVABLE ASBESTOS WALLS

The keystone of flexibility in Unit Construction is the J-M Transite Asbestos Wall. Can be disassembled and relocated as often as needs require, without waste . . . with little or no inconvenience. Made of fireproof asbestos and cement, practically indestructible materials, the movable panels form rigid, double-faced partitions, 4" thick. Can also be used as interior finish of the outside walls. Removable Transite panels permit ready access to wiring, etc.

ACOUSTICAL CEILINGS

Helping to overcome the hand
cap of distracting noise, J-
Acoustical Ceilings provide
quieter and more pleasant offi
atmosphere . . . reduce fatig
and nervousness . . . and thus
beneficial to health and worki
efficiency. Demountable units
easy to clean, have high coefficients of sound-absorpti
and light-reflection. An exclusive J-M patented constru
tion system permits interchangeability of flush-type fl
rescent lighting and acoustical ceiling units.

Now, Executive Offices can be flexible, too!

Johns-Manville System of Unit Construction—Walls, Ceilings, Floors—provides flexibility as well as architectural beauty. Now you can enlarge, decrease, or rearrange office areas whenever needs require!

WHETHER you're thinking of a private executive office, a suite of offices, or an entire office building, Johns-Manville offers you a completely new and practical method of interior construction which has the combined advantages of flexibility, greater comfort, and attractive appearance.

Unit Construction meets the problem of ever-changing business needs. You can now provide for endless revisions of space-use—*at low cost*. Three Johns-Manville materials are united to form Unit Construction:

1. **Movable Asbestos Walls . . .** readily assembled . . . interchangeable . . . 100% salvageable. Made of asbestos-cement Transite panels, they combine all the qualities of permanent construction. And they are hard to mar, easily cleaned—advantages that make a big difference in the maintenance budget.
2. **Acoustical Ceilings** . . . attractive . . . demountable . . . reduce distracting noise. Units can be taken down and relocated as desired.
3. **Colorful, Resilient Floors** . . . quiet underfoot. Small units permit easy extension of floor pattern.

This executive office is part of a complete building interior, using J-M Unit Construction throughout. Structurally flexible, it can easily be taken down and re-erected to meet changing business needs—yet it has all the qualities of solid, permanent construction.

The constituent parts of J-M Unit Construction are *built to last*. And they're so easy to keep clean that they bring maintenance costs way down.

Moreover, this proved method of construction makes the whole interior—walls, ceilings, floors—available under *one* specification, *one* manufacturer's responsibility.

Write for colorful brochure, showing many uses of this important development. Johns-Manville, P. O. Box 290, New York 16, N. Y.

COLORFUL, RESILIENT FLOORING

J-M Asphalt Tile Flooring completes the Unit Construction System. Made of asbestos and asphalt, the units withstand hard wear and give long years of service. Even a carelessly dropped cigarette will not mar their built-in beauty. Not only durable, J-M Asphalt Tile Floors are pleasantly comfortable and quiet underfoot. Individual units permit easy alterations or extension of patterns. Made in a wide variety of plain and marbleized colors.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville Unit Construction

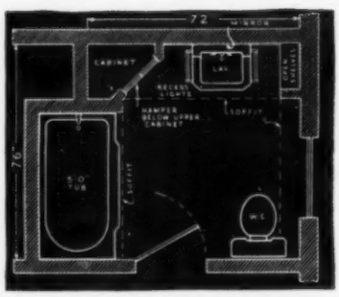
- ASPHALT TILE FLOORS
- MOVABLE TRANSITE WALLS
- ACOUSTICAL CEILINGS

Right for today's practical planning . . . a KOHLER bathroom

WHEN you specify Kohler plumbing for a new or remodeled home you provide the right combination of what every home owner wants in his fixtures and fittings—attractive appearance with matching designs; efficient sanitary protection; convenient, durable working parts; and lustrous, easy-to-clean surfaces. There is sound investment value, too, in the fact that the name "Kohler" is a recognized symbol of first quality—for it will add to the future ease with which a home can be rented or sold.

Kohler fixtures and fittings shown in the illustration above are the Gramercy vitreous china lavatory (available in sizes 22x18" and 24x20") with built-in fittings and roomy shelf; the Cosmopolitan Bench Bath, made with durable, gleaming enamel on time-tested, non-flexing cast iron—and equipped with the efficient Triton shower mixer; and the quiet, smooth-functioning Wellworth close-coupled closet.

All Kohler fixtures and fittings now being produced embody the same high degree of excellence, in design, workmanship and materials, that has built the 73-year-old tradition of Kohler quality. Production, at Kohler, is centered in one plant, with unity of supervision. Write for information on products now available. Kohler Co., Dept. 12-PA, Kohler, Wis. Established 1873.



This practical arrangement *of Kohler fixtures, in a bathroom of moderate size, is compact yet convenient, with easy access to all facilities, including cabinets, shelves and hamper.*

KOHLER OF KOHLER

PLUMBING FIXTURES AND FITTINGS • HEATING EQUIPMENT • ELECTRIC PLANTS

STEEL FRAMING IS SIMPLIFIED, EFFICIENT AND ECONOMICAL

BUILD WITH

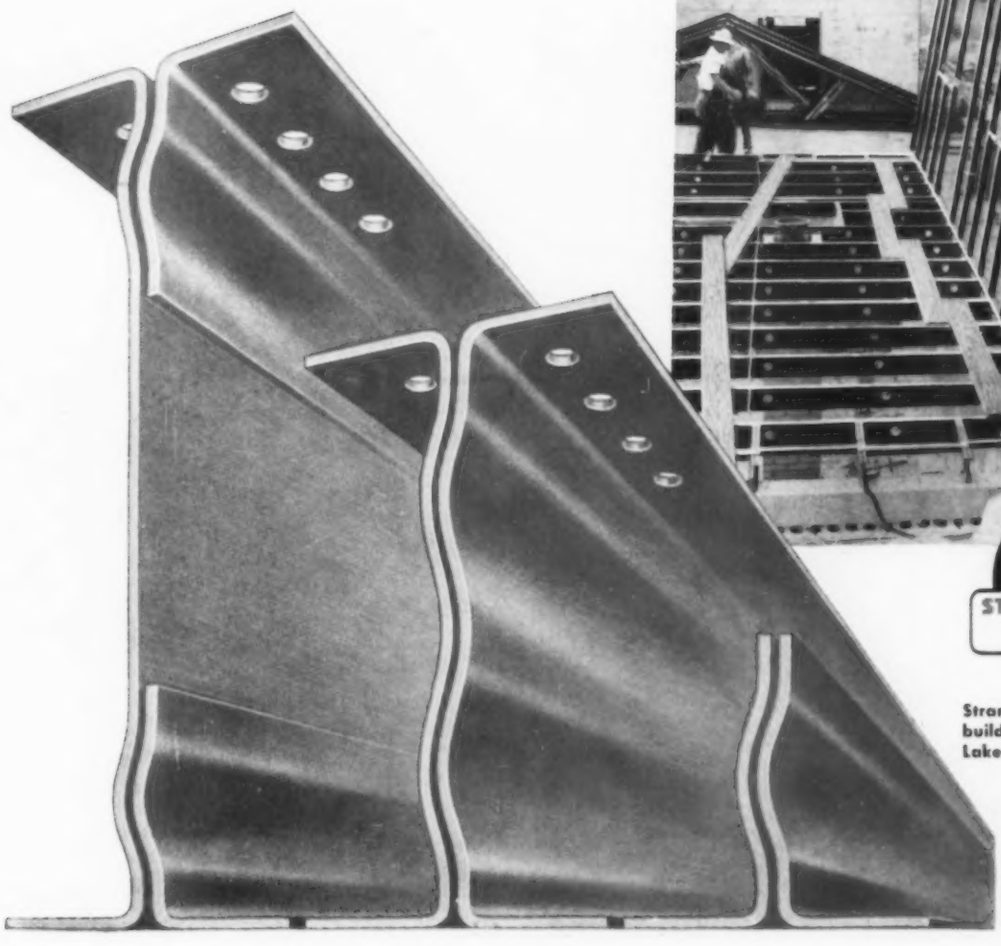
STRAN STEEL

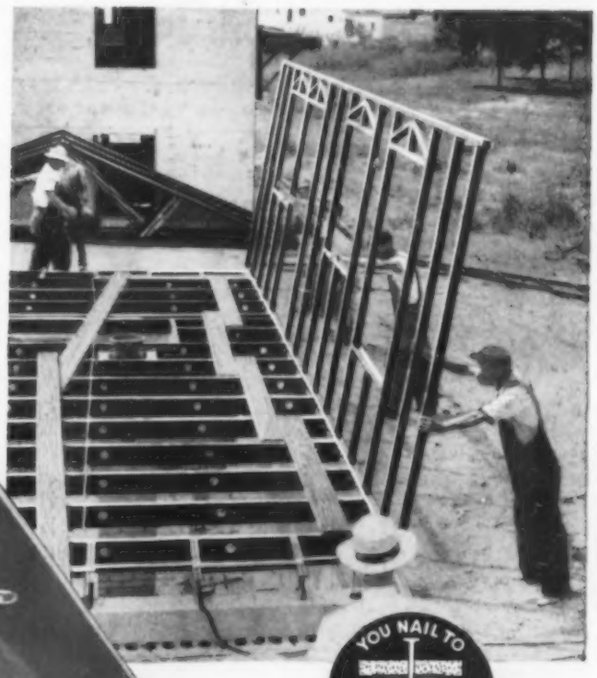
● **SIMPLICITY**—With versatile Stran-Steel, only a few basic types of framing members are required. Assembly on the site is fast and easy, because all materials are pre-cut to precision lengths. Erection tools are simple, too; ordinary carpenter's equipment does the job.

● **EFFICIENCY**—Stran-Steel framing can be assembled quickly with sheet metal screws or by welding. Collateral materials are *nailed* securely *to the frame itself* by means of the *nailing groove*, a patented feature of all Stran-Steel joists and studs. Architects have full latitude in working out widely varied exteriors in brick, lumber, stone and other materials.

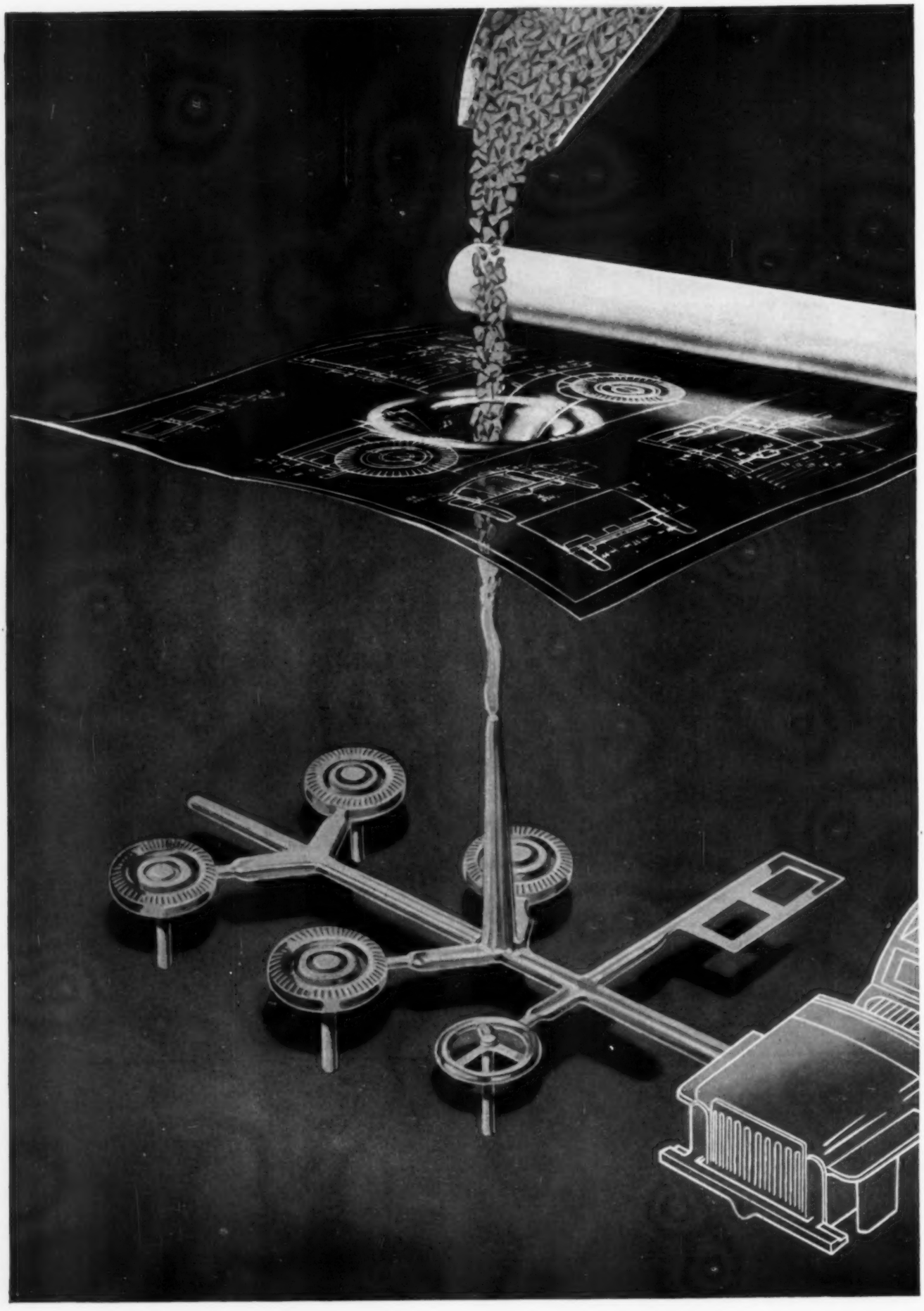
● **ECONOMY**—In apartments, terraces and other multiple housing projects where framing members are duplicated frequently, Stran-Steel usually costs no more than other framing materials. In single homes, stores or other individual light-load buildings, the initial cost of Stran-Steel may be slightly higher, but the extra investment is repaid many times over in low upkeep and longer building life. For details, see Sweet's File, Architectural, Sweet's File for Builders, or the January issue of Building Supply News.

GREAT LAKES STEEL CORPORATION
Stran-Steel Division • Penobscot Building • Detroit 26, Mich.
UNIT OF NATIONAL STEEL CORPORATION

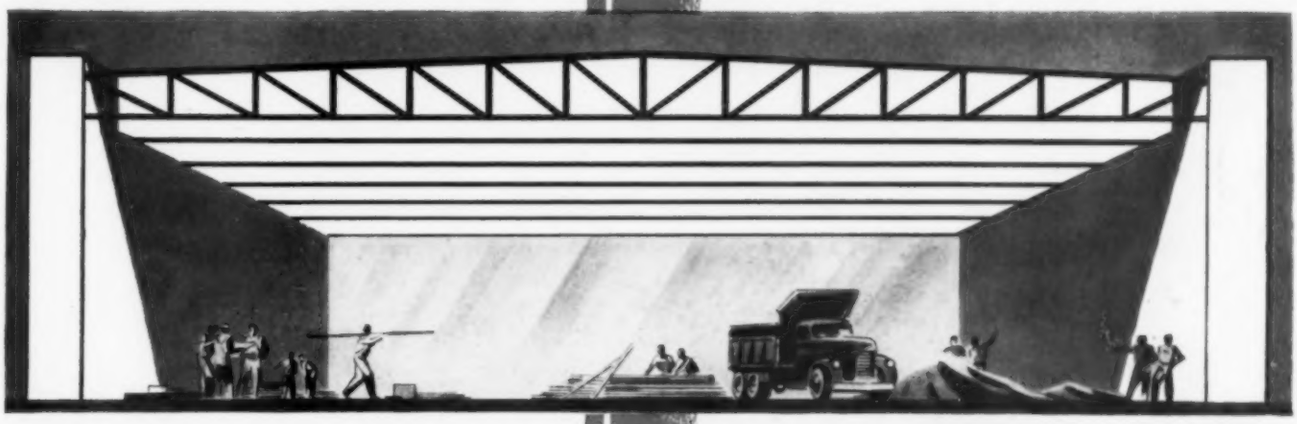




Stran-Steel products are building products of Great Lakes Steel Corporation.



Now · · · CLEAR SPANS UP TO SIXTY-FOUR FEET



WITH TRUSCON CLERESPAN *Joists*

● Truscon "Clerespan" Joists can be used advantageously in buildings for all types of service regardless of their location. They are ideally adaptable for the safe, fire-proof construction of garages, halls, auditoriums, gymnasiums, factories and other structures where wide, column-free areas are required.

Truscon "Clerespan" Joists offer these distinctive features:

1. **Can be used for unusually wide spans up to 64 feet.**
2. **Equally adaptable to roof and floor construction.**
3. **Economical in cost.**
4. **Light in weight.**
5. **Fire-resistant.**
6. **Easily and speedily erected.**
7. **Can be accurately located in a structure and easily inspected.**
8. **All connections electrically arc welded.**
9. **Open web system allows passage of pipes and conduits.**
10. **Completely shop fabricated, and reach the job ready to install.**

Ask experienced Truscon engineers for assistance in helping you develop efficient floor areas with Truscon Clerespan Steel Joists.

Send for this free catalog.

● **Typical roof construction with Truscon Clerespan Joists**

● **Wide, column-free areas achieved with Truscon Clerespan Joists**

TRUSCON STEEL COMPANY
Reg. U. S. Pat. Off.
YOUNGSTOWN 1, OHIO • Subsidiary of Republic Steel Corporation

Manufacturers of a Complete Line of Steel Windows and Mechanical Operators . . . Steel Joists . . . Metal Lath . . . Steeldeck Roofs . . . Reinforcing Steel . . . Industrial and Hangar Steel Doors . . . Bank Vault Reinforcing . . . Radio Towers . . . Bridge Floors.

FLEXIBILITY *and* STRENGTH *of* RIC-WIL CONDUIT PERMITS SHALLOW INSTALLATION *of* STEAM LINES

-even under Railroad Loadings

Underground steam line between RR sidings with expansion loop extending under tracks.

21 ft. Ric-wiL Prefabricated Insulated Pipe unit lowered into trench alongside tracks at RR passenger station without interrupting rail traffic.

The heavy-gauge helically corrugated shell used in Ric-wiL Prefabricated Insulated Pipe Units makes possible a resilient construction of high beam strength, which can safely be installed under E72 RR loadings with only 3 feet of ground cover, and under E90 loadings with only 5 feet. Because of this and other exclusive Ric-wiL features, the trend of engineering departments of railroads is to specify Ric-wiL for all underground steam lines. It is possible to jack Ric-wiL through existing right-of-ways and to install steam lines without disturbing sidewalks, pavement or tracks and without permanent deformation of roadbeds, thus saving both installation and maintenance expense.

Secret of the strength and flexibility of Ric-wiL units is in these corrugations. Seam-welded, helically corrugated, heavy gauge galvanized iron shell with full round smooth ends and special Ric-wiL coupler, provide pressure-tight construction.

(Left) Normal traffic was maintained on this busy downtown street while Ric-wiL units were installed under pavement. Units were jacked through from building basements and joined to utility's steam main at manhole in center of street. *(Right)* Close-up of manhole showing auger crew and tool for drilling under pavement.

Before you draw up specifications for your next underground steam line, get all the facts about Ric-wiL. Write for catalog.

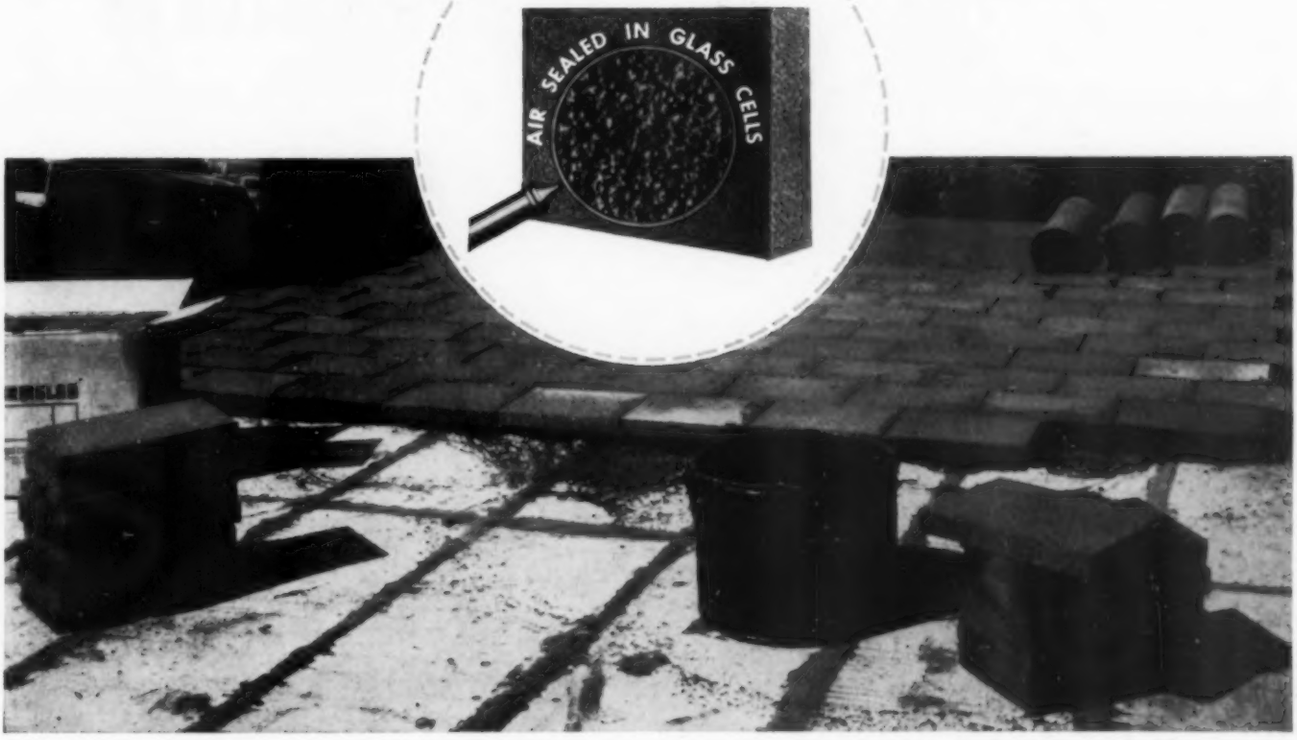
RIC-WIL INSULATED PIPE CONDUIT SYSTEMS

THE RIC-WIL COMPANY · CLEVELAND, OHIO

AGENTS IN PRINCIPAL CITIES

SAVE TIME AND MONEY WITH

PC FOAMGLAS INSULATION



AN important cost factor in insulating jobs is the labor cost of installing the insulating material. And men who have used many kinds of insulation can tell you that PC Foamglas is so light in weight, so conveniently packaged, that it can be installed more quickly by fewer men – saving both time and money.

PC Foamglas, the cellular glass insulation, is fireproof, waterproof and verminproof. It is unaffected by excessive humidity, impervious to common acids. It therefore retains its original insulating efficiency indefinitely, without repairs or maintenance. That means protection against the additional cost which is incurred when defective insulating material has to be torn up and replaced.

In walls and floors, on flat deck roofs, of all sorts of plants all over the country, PC Foamglas is helping to maintain desired temperature levels, to minimize condensation, economically, *permanently*.

You will find a lot of helpful information in our manuals on PC Foamglas insulation. Lavishly illustrated, they contain valuable engineering data, tables, charts and installation details. Check your choice on the convenient coupon, mail it to us and free copies of our booklets will be sent to you promptly, without obligation. Pittsburgh Corning Corporation, Room 195, 632 Duquesne Way, Pittsburgh 30, Penna.

· Also Makers of PC Glass Blocks ·

PC FOAMGLAS *Waterproof Fireproof* **INSULATION**

T. M. REG. U. S. PAT. OFF.

LIGHT IN WEIGHT, rigid and strong, PC Foamglas is conveniently packaged for easy handling on the job. It can be installed quickly by minimum crews, thus saving time and labor cost.

Pittsburgh Corning Corporation
Room 195, 632 Duquesne Way
Pittsburgh 22, Pa.

Please send me without obligation, your free booklets on the use of PC Foamglas insulation for:

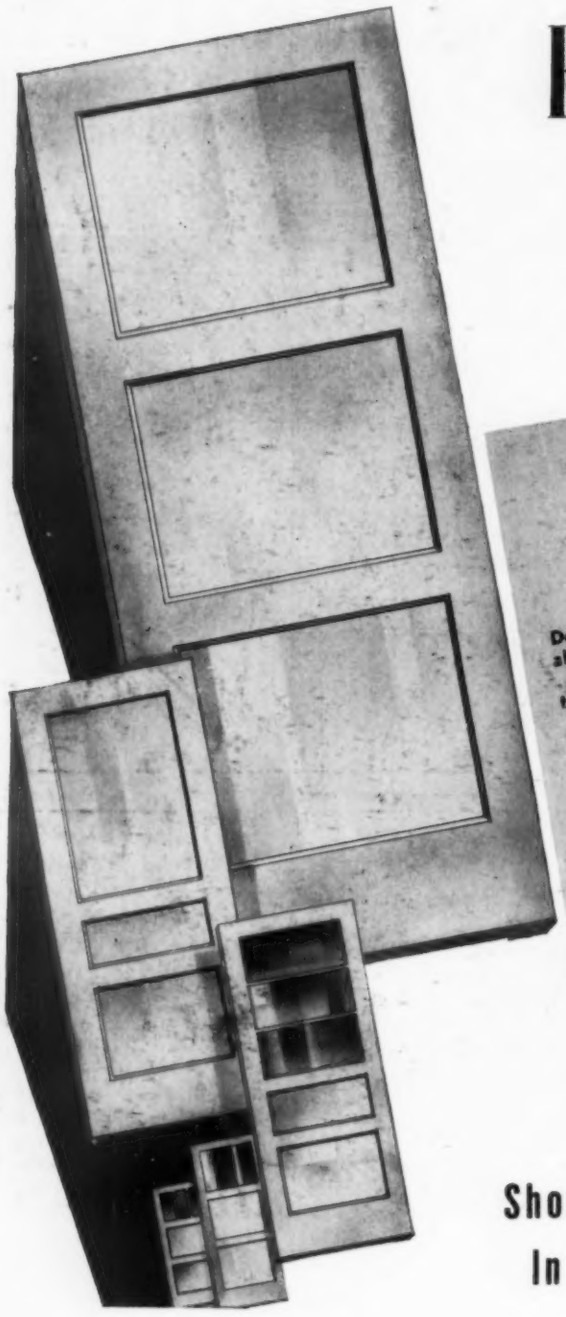
Roofs..... Walls..... Floors.....

Name.....

Address.....

City..... State.....

These Features Make Douglas Fir Doors Easier and Quicker to Install



PRE-FIT

Douglas fir doors will be available pre-fit to exact book size . . . ready to hang without on-the-job sawing and fitting.

FACTRI-FIT

Douglas fir doors will also be available completely machined — not only pre-fit, but gained for hinges and mortised or bored for locks as well. Doors will be grade-marked, as in the past, for ease in specification and ordering. They'll be better doors in every way.

PRE-SEALED

Douglas fir doors will be available pre-sealed . . . a feature which improves dimensional stability, reduces moisture absorption, and eliminates the need for one prime coat.

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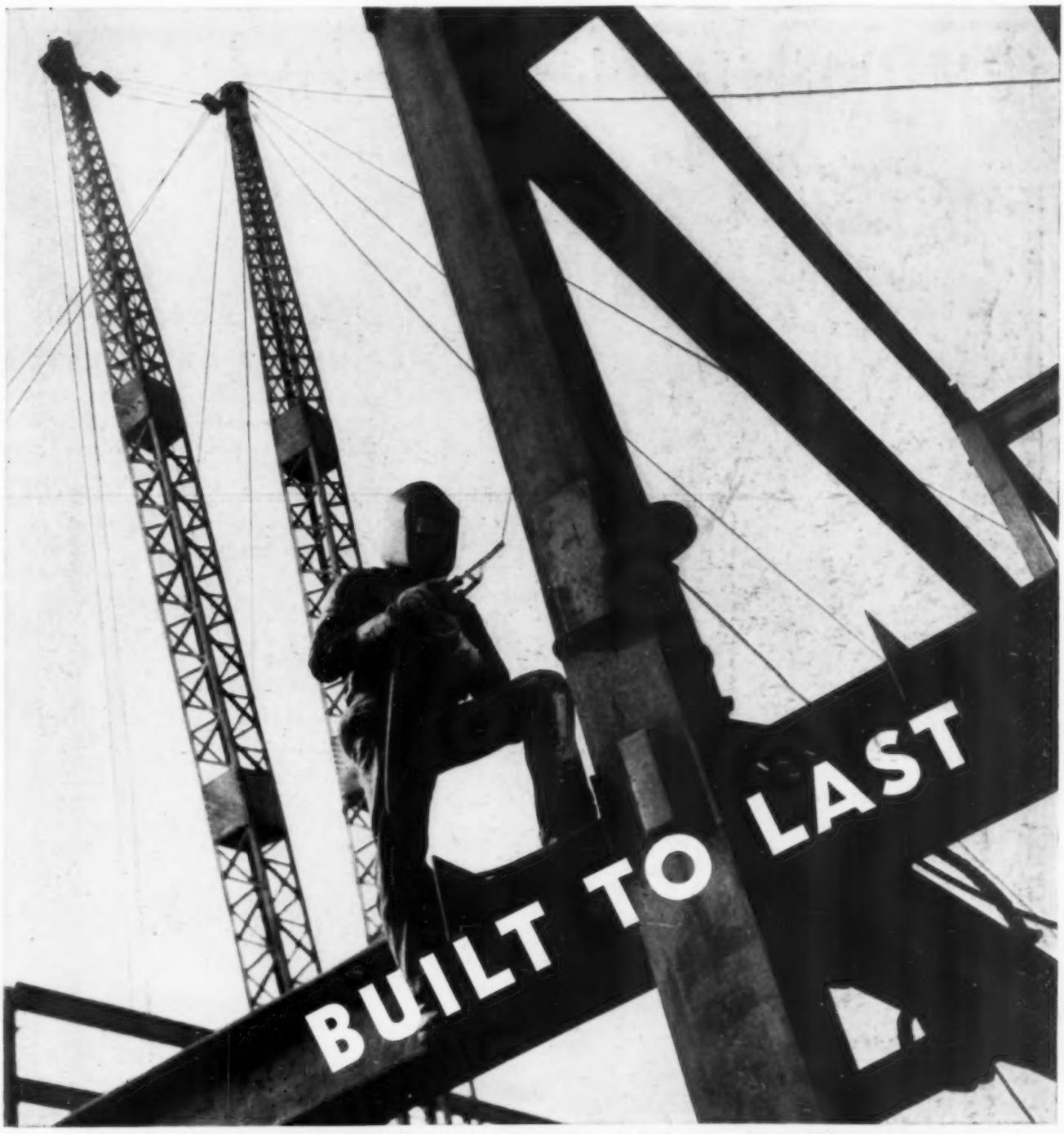

Every drop-forged Von Duprin Self-Releasing Exit Device is built to outlast the best steel and concrete that man knows how to make. Engineered for the tremendous demands of emergencies, these Von Duprins will operate for scores of years with little or no attention or maintenance cost. They have a safety factor, speed of operation, and brute strength undreamed of a few years ago. See Sweets' Index, Sec. 17B/2. Von Duprin Division, Vonnegut Hardware Co., Indianapolis.

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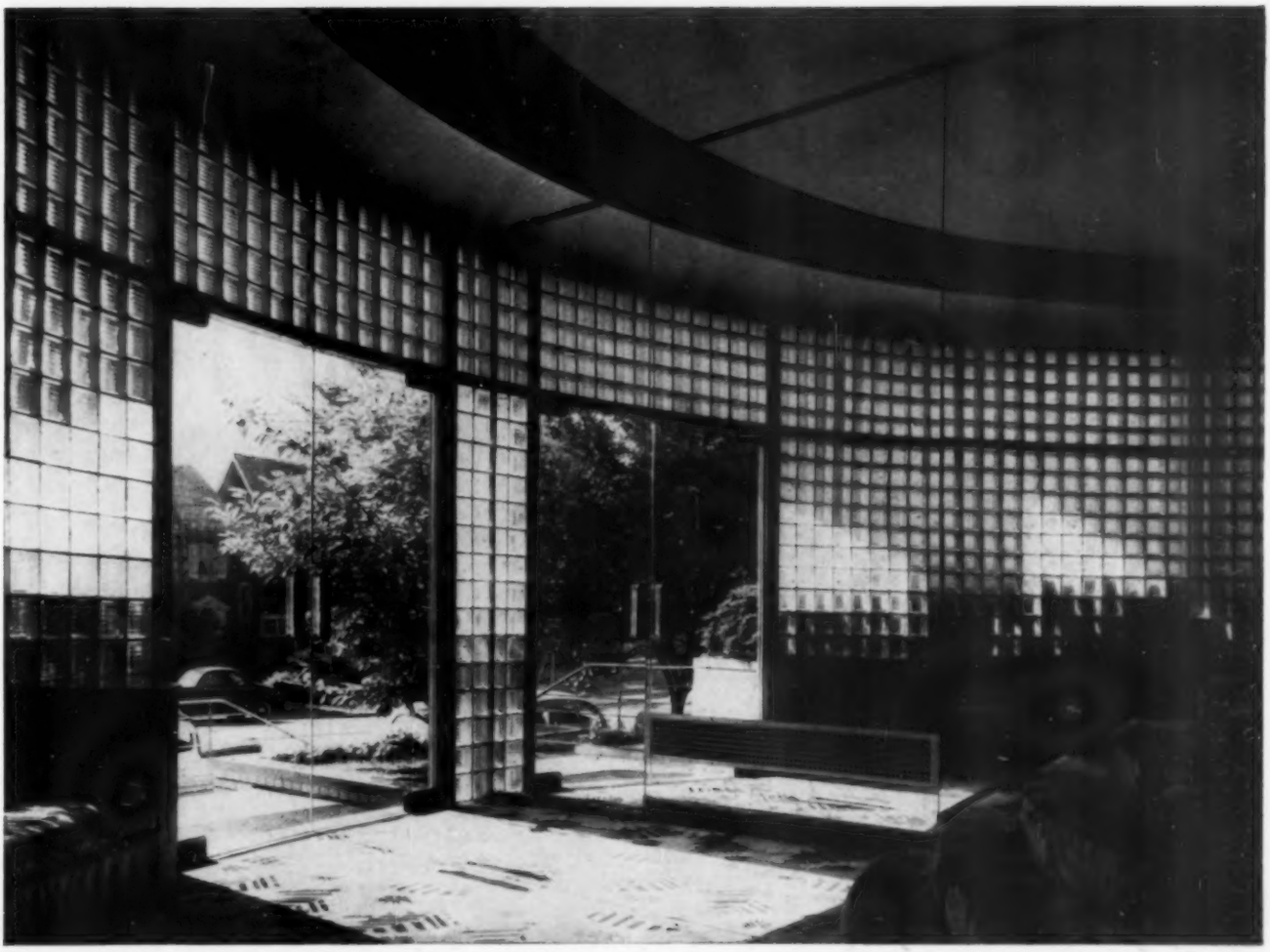

Good example of the functional and decorative value of Insulux Glass Block — the lobby of this apartment on Wisconsin Ave., Washington, D.C., is light—appears spacious, luxurious. Architects Berla & Abel have maintained a clean simplicity of design. Insulux panels transmit daylight freely, while barring the street view in private portions of the room. Builder is H. K. Jawish.

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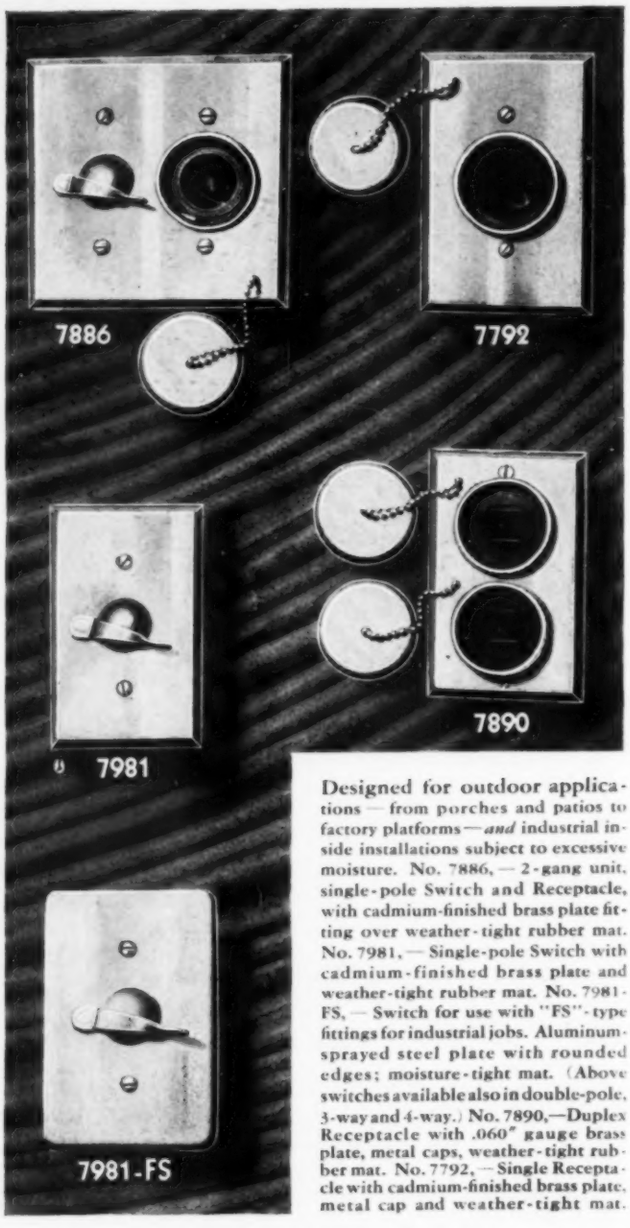

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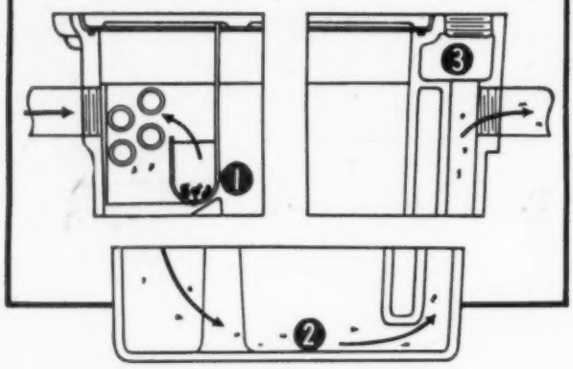

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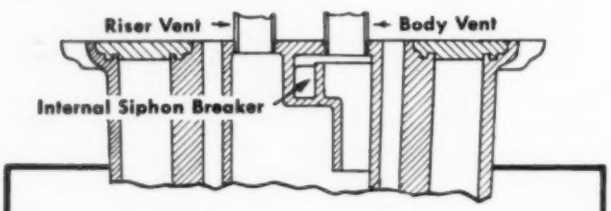

and riser vents with optional top or side outlets, and an internal siphon breaker. These prevent emptying of trap by siphoning or built-up pressure.

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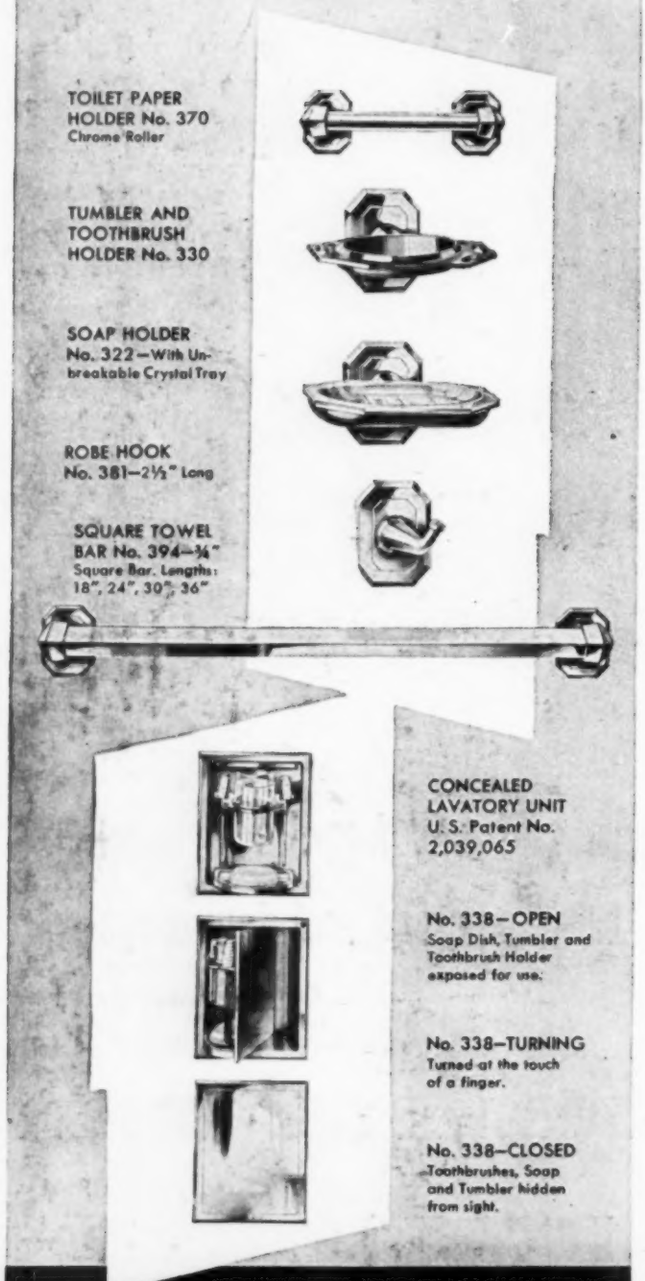
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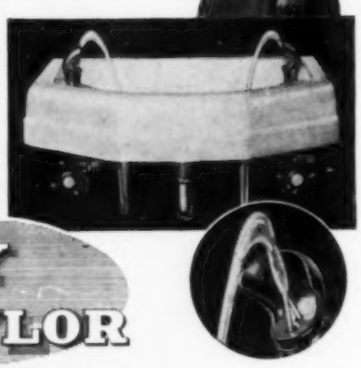

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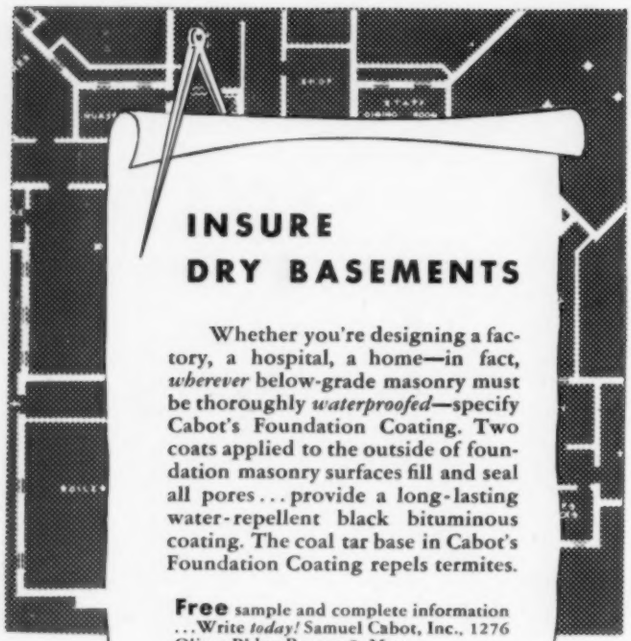

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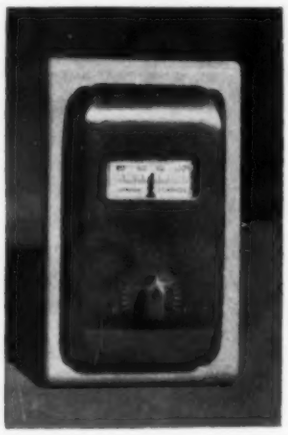

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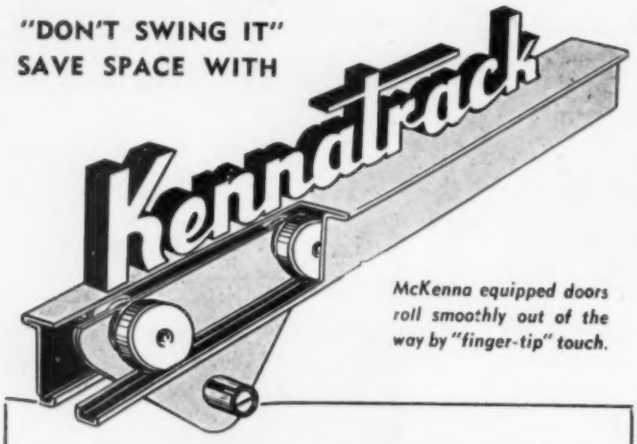

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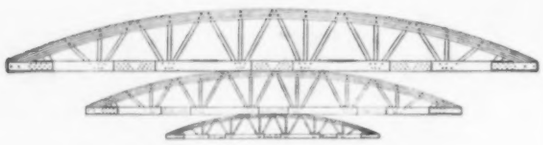

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INDEX TO ADVERTISERS

Adam, Frank, Electric Co. 21
Airtemp Division of Chrysler Corp. 105
Air Transport Association for Railway Express Agency 100
Aluminum Co. of America 13
American Brass Co., The 103
American Lead Pencil Co. 95
American Radiator & Standard Sanitary Corp. 26
American Roof Truss Co. 126
American Steel & Wire Co. 99
American Telephone and Telegraph Co. 22
Anaconda Copper Mining Co. 103
Arkwright Finishing Co. 18
Armstrong Cork Co. 2, 3
Arrow-Hart & Hegeman Electric Co. 114
Associated Projects Co. 120

B & T Metals Co. 122
Barber-Colman Co. 98

Cabot, Samuel, Inc. 122
Calcium Chloride Assn. 16
Cambridge Tile Mfg. Co. ..... 3rd Cover
Case, W. A., & Son Mfg. Co. 36
Ceco Steel Products Corp. 127
Celanese Plastics Corp. 92, 93
Chase Brass & Copper Co. 101
Cheney Industries 128
Cleveland Lock Works 106
Columbia Steel Co. 99
Corbin, P. & F., Division, American Hardware Corp. 34

Duriron Co., Inc. 94

Elliott, B. K., Co. 122
Esterbrook Pen Co. 104

Field, Alfred & Co., Inc. 128
Fir-Door Institute 110
Flynn, Michael, Manufacturing Co. 129
Formica Insulation Co., The 37

Gate City Sash & Door Co. 102
General Bronze Corp. 30
General Controls Co. 122
General Electric Co., Air Conditioning Div. 125
General Pencil Co. 116

Hall-Mack Co. 118
Hart & Hegeman Div., Arrow-Hart & Hegeman Electric Co. 114
Hope's Windows 38

Imperial Tracing Cloth 102
Indiana Limestone Institute 35
Insulux Products Division, Owens-Illinois Glass Co. 113

Jamison Cold Storage Door Co. 128
Jenkins Brothers ..... 2nd Cover
Johns-Mansville Corp. 88, 89
Josam Manufacturing Co. 7

Kaufmann & Fabry Co. 112
Kennedy, David E. 33
Keuffel & Esser Co. 23
Kinnear Manufacturing Co. 96
Kohler Co. 90
Koppers Co., Inc. 115

Libbey-Owens-Ford Glass Co. 97
Louisville Cement Co., Inc. 27

Majestic Co. 120
McKenna, Jay G., Inc. 126
Mengel Co., Inc. 6, 114
Montgomery Elevator Co. 104
Mueller Brass Co. 28
Mudon, J. T., Co. 120

National Gypsum Co. 119

Otis Elevator Co. 24
Owens-Illinois Glass Co., Insulux Products Div. 113

Petroleum Heat & Power Co. 32
Pittsburgh Corning Corp. 109
Pittsburgh Plate Glass Co. 29
Post, Fred., Co. 112
Prima Products, Inc. 117

Raymond Concrete Pile Co. 9
Reinhold Publishing Corp. 19, 118, 123, 124
Revere Copper and Brass Inc. 121
Ric-Wil Co. 103
Robertson, H. H., Co. 11
Roddis Lumber & Veneer Co. 20
Rohm & Haas Co. 17
Rosenthal Co. 126

Sedgwick Machine Works 10
Servel, Inc. 4, 5
Sisalkraft Co. 128
Spencer Turbine Co. 12
Staedtler, J. S., Inc. 130
Stanley Works, The 87
Stran-Steel Division of Great Lakes Steel Corp. 91
Streamline Pipe and Fittings Division 28

Taylor, Halsey W., Co., The 120
Tennessee Coal, Iron & Railroad Co. 99
Tile-Tex Co., The 15
Trinity Portland Cement Co. ....Back Cover
Truscon Steel Co. 107

United States Plywood Corp. 6, 114
U. S. Steel Export Co. 99

Vonnegut Hardware Co. 111

Wade Manufacturing Co. 116
Warren Webster & Co. 131
Wheeler, Osgood Co., The 31
Wilson Engineering Corp. 126

Youngstown Sheet & Tube Co. 25

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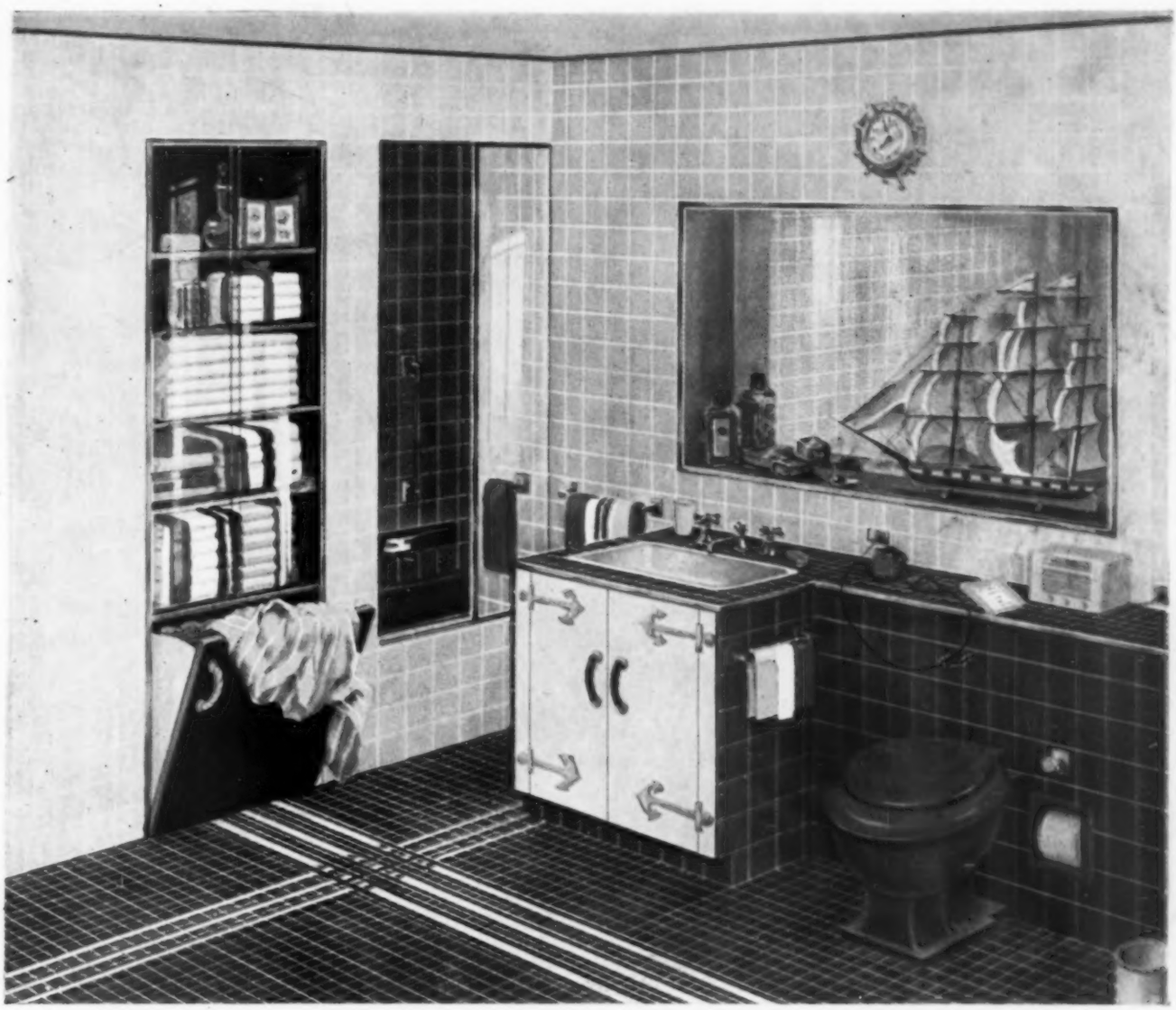

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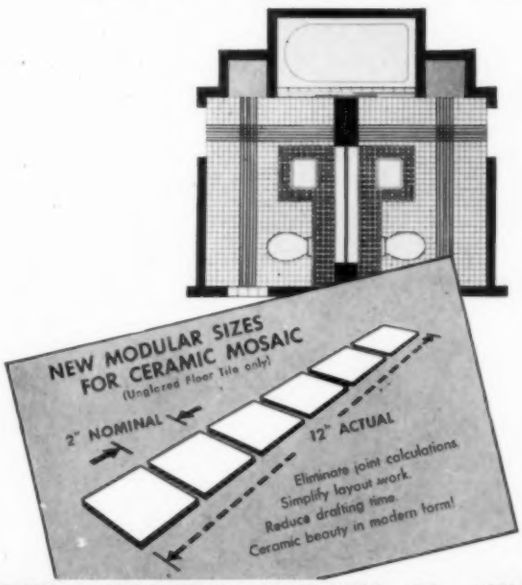

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